BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 57 1960 No. 5

SUMMARY OF RECENT ABSTRACTS *

IV. TRYPANOSOMIASIS †

African Trypanosomiasis

Human

General: Epidemiology

The International Scientific Committee for Trypanosomiasis Research (p. 18) published the account of its 6th meeting, held in Salisbury, Southern Rhodesia, in 1956. The original account should be consulted for the 31 separate papers.

The report of the East African Trypanosomiasis Research Organization for 1956–57 (p. 494) deals with a large amount of work, much of which has been reported elsewhere. In the report of the West African Institute for Trypanosomiasis Research for 1958 (p. 1011) Nash records work on infection of *Glossina palpalis* with *Trypanosoma gambiense* and on cattle trypanosomes. There was also considerable work on the ecology of tsetse flies in different parts of Nigeria, and on various aspects of animal trypanosomiasis.

The report of the Tsetse Fly and Trypanosomiasis Committee of the Colonial Office for 1957–58 (p. 677) mostly deals with problems related to cattle trypanosomiasis. The scope is indicated in the original abstract. There is a note that in Kenya Dieldrex sprayed from the air appears to have eliminated *G. palpalis* from 300 miles of 2 river systems.

Human sleeping sickness continues to occur in Mozambique, where 127 new cases were reported in 1956—the lowest figure since 1942 (Annual Report for 1956 of the Trypanosomiasis Commission, p. 1112); the incidence was 0·17 per 1000. Very large numbers of cattle were treated for trypanosomiasis, and fly control was carried out by clearing and game destruction.

Davey (p. 518), in a general discussion of trypanosomiasis of man and animals in Africa, remarks that the human disease is no longer a major

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1959, v. 56. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on trypanosomiasis in this series, see the May issues of the *Tropical Diseases Bulletin* each year since 1939.

problem, but that control of cattle trypanosomiasis is still difficult. He notes that Africans rarely stay in areas where the cattle die, and therefore move away from contact with *G. morsitans*.

In a critical review of the epidemiology of human trypanosomiasis in Africa ASHCROFT (p. 1073) traces the history of the discovery of the polymorphic trypanosomes, and supports the view that *T. rhodesiense* and *T. brucei* are distinct. Wild animals act as reservoir for *T. rhodesiense* but their importance is still difficult to assess, and an animal infected with *T. rhodesiense* but subject to reinfection with *T. brucei* may not be able to act indefinitely as reservoir of *T. rhodesiense* without reinfection from man; otherwise the *T. rhodesiense* infection is likely to be so diluted by *T. brucei* that mixed strains do not contain enough *T. rhodesiense* to remain pathogenic for man. *T. gambiense*, on the other hand, is transmitted from man by tsetse flies to man. He concludes that apart from *T. brucei* there is one polymorphic trypanosome which has the characteristics of either *T. gambiense* or *T. rhodesiense* according to whether its principal hosts are man or wild animals, and that this will depend on the habits and food preferences of the species of tsetse fly acting as vector.

Transmission

In the French Cameroons *G. palpalis* is found on the coast and inland in the south-west; *G. fuscipes* occupies the remaining area to the north and east. MOUCHET *et al.* (p. 700) think that *G. fuscipes* may be replacing *G. palpalis* in this part of Africa.

WIJERS (p. 597) has observed that in *G. palpalis* fed at various ages on monkeys infected with *T. gambiense* the rate of infection was 7·6% of flies fed when 1 day old, and fell to 0·7% in those fed first on the 3rd day, and to nil at later times. The explanation offered is that the peritrophic membrane in the young fly may be weak or incomplete, and may allow the passage of trypanosomes more easily than in older flies. MCDONALD and WIJERS (p. 1223) describe the technique by which they infect *G. palpalis* with *T. gambiense* by the anal route; this appears to give more satisfactory results than by feeding the flies on infected animals.

MAILLOT (p. 19) describes the rearing of *Glossina fuscipes quanzensis* at Brazzaville.

NASH and JORDAN (p. 1224) have issued a guide to the identification of West African species of the *fusca* group by dissection of the genitalia.

A spread of *G. morsitans* in part of Angola is reported by JANZ *et al.* (p. 1114). FOSTER (p. 809) discusses the maintenance of colonies of *G. morsitans* in various conditions; details should be sought in the original. In an experiment on sterilization of *G. morsitans* by exposing pupae to radiation, POTTS (p. 597) found that there was increased mortality in pupae exposed to high doses, that the length of life of males was reduced but there was no loss of mating ability, and that only 10% of males and 16% of females were fertile.

Aetiology

In 1958, for the first time, HEISCH *et al.* (p. 698) isolated *T. rhodesiense* direct from a wild bushbuck. The infected blood of the bushbuck, which was one of several animals shot in Kenya, was inoculated into a rat and thence into a human volunteer who became infected. This constitutes proof that Rhodesian sleeping

sickness is a zoonosis, as has long been suspected. FRIEDHEIM *et al.* (p. 1222) tested the sensitivity of the trypanosome isolated by Heisch and his colleagues to tryparsamide and Mel B. It was insensitive to tryparsamide but sensitive to Mel B, in agreement with the usual response of *T. rhodesiense* to these drugs.

ORMEROD (p. 519) describes the cytoplasmic inclusions (volutin granules) found in trypanosomes. They seem to be connected with the immune reaction of the host—in *T. rhodesiense* they reached their highest number in chronic infections, and in *T. lewisi* their appearance coincided with inhibition of reproduction by ablastin.

GORDON and WILLETT (p. 698) describe studies on the development of *T. rhodesiense* from the metacyclic forms, as observed in experimental animals and in culture; the authors consider that development observed *in vitro* corresponds to that taking place *in vivo*. Details should be sought in the original. In monkeys and rats infected with *T. gambiense* and *T. rhodesiense* WIJERS (p. 1113) correlated the different forms—slender, intermediate and stumpy—with the degree of parasitaemia. During a rise in parasitaemia the proportion of slender forms was highest; during a decrease the stumpy forms predominated.

NIEMEGEERS (p. 809) observed that both *T. gambiense* and *T. rhodesiense* progressively lost mobility in preserved blood at 3°C., up to 10 days, and lost infectivity for rodents in 3 days. In endemic sleeping sickness areas the risk from blood transfusion can be avoided by preserving the blood for at least 3 days.

LARIVIÈRE (p. 134) observes that the Gambian rat (*Cricetomys gambianus*) is an excellent host for isolating and maintaining *T. gambiense*.

WERNER and KUNERT (p. 134) show that injection of Euphyllin into pregnant mice causes changes in the placenta which permit the passage of *T. gambiense* or *T. cruzi* from the infected mother to the foetus.

LEVADITI *et al.* (p. 135) failed to induce neurotropism by passaging *T. brucei*, *T. equiperdum* and *T. congolense* intracerebrally in mice; the Yaoundé strain of *T. gambiense*, already neurotropic, was not made more so by similar passage.

Attempts to cultivate *T. brucei* in the NN medium of Novy and MacNeal, and in the modification known as NNN, are unsuccessful, and this medium is usually reserved for *T. cruzi* and other trypanosomes of the *lewisi* group. PACKCHANIAN (p. 1222) has now developed another modification (NNP), which is described in the original abstract, and in which he has successfully cultivated *T. brucei*, but not, apparently, the metacyclic forms, since the cultures have failed to infect rodents. Other trypanosomes of the *brucei* and *lewisi* groups have also been cultivated in it.

In a highly technical paper which should be read in full, FULTON and SPOONER (p. 1113) discuss the respiration of certain mammalian trypanosomes.

Clinical Findings

JANSSENS *et al.* (p. 19) examined the cerebrospinal fluid in subacute or chronic *T. gambiense* infection, finding an increase in gamma globulin, and changes in other components. GRIFFITHS (p. 280) has used a colloidal gum mastic reaction with the serum of animals infected with *T. brucei* or *T. rhodesiense*; it may be valuable in diagnosis. By precipitating serum globulins at various *p*H values RAINAUT *et al.* (p. 280) have demonstrated an abnormal euglobulin in the early stages of trypanosomiasis. It disappears soon

after treatment is started, and the test for it is therefore useful in showing the effect of treatment.

In experimental work on mice LAPIERRE *et al.* (p. 20) show that infection with *Spirochaeta duttoni* (but not *S. hispanica*) confers some protection against subsequent infection with *T. gambiense*; a similar effect had formerly been observed in protection against *T. brucei*. BEZON and DUCASSE (p. 279) suggest that influenza has an activating or synergic neurological effect on trypanosomiasis [*T. gambiense*], whether this has been treated with arsenicals or not.

THURSTON (p. 281) observed that immune serum which caused a decrease in motility of *T. brucei* also caused a decrease in oxygen uptake, but measurement of oxygen uptake is less sensitive than a neutralization test as a measure of antibody activity.

Treatment

RICHET *et al.* (p. 1114) treated a large number of patients with *T. gambiense* infection in North Dahomey; they were in various stages of the disease and the drug was Mel B (arsobal). The results were remarkable, and the drug is safe if properly used. It should not be given to the very young or those in poor condition or with psychic changes. It should only be used for advanced disease. It should be preceded by a course of tryparsamide (or the diamidines which should be used for first-stage disease), and BAL should always be available for the treatment of toxic effects. The authors have had no fatalities due to Mel B since strict precautions were taken. FRIEDHEIM and DE JONGH (p. 1115) have now prepared a water-soluble derivative of arsobal, which they call Mel W. In mice it was equal to arsobal as a trypanocide, and in a few human cases of *T. gambiense* infection it showed a significant improvement on arsobal.

FRIEDHEIM (p. 924) gives an account of the history of the chemotherapy of African trypanosomiasis.

FULTON and MATHEW (p. 812) shows that radioactive stilbamidine is found unchanged in the tissues of injected rats, especially in the liver; the drug acts directly on trypanosomes. DEROOVER (p. 132) discusses a focus of sleeping sickness in the Belgian Congo where tryparsamide-resistant cases were common and pentamidine was introduced for treatment. This was useful, but the author writes more favourably of arsobal for all stages of the disease, particularly the late stages. KLINKHAMER (p. 598) in Liberia uses pentamidine isethionate in treatment, but has observed gross manifestations of hypoglycaemia in treated subjects; this should be regarded seriously—it can be relieved by consumption of sugar or by intravenous glucose.

AINLEY and DAVEY (p. 20) report a high degree of activity in certain pyrimidylaminophenylarsonic compounds against *T. rhodesiense* in mice. BAKER (p. 519) writes on 4-(2:6-diaminopyrimidin-4-ylamino) phenylarsine oxide (Compound 12,065) in *T. rhodesiense* infections of laboratory animals; its curative power was approximately the same as that of Mel B.

TRINCAO *et al.* (p. 1116) report favourably on amphomycin in *T. rhodesiense* infection of mice.

Conflicting results were obtained by ASHCROFT (p. 925) in the treatment of *T. rhodesiense* infections in rats with cortisone. Large doses of drug had a toxic effect; lower doses led to lighter infections than in controls, but with still lower doses the treated animals had higher parasitaemia than the controls.

Control

In part of Northern Nigeria where control of *G. palpalis* and *G. tachinoides* by normal partial clearing had become uneconomic, DAVIES (p. 133) tried DDT spray along river banks and over the vegetation. The results against *G. palpalis* were good after several treatments, but with *G. tachinoides* they were inconclusive. The cost of spraying was about half the cost of clearing by normal methods. In Kenya FAIRCLOUGH and THOMSON (p. 423) treated vegetation along rivers by spraying DDT from the river beds; the numbers of *G. palpalis fuscipes* were very greatly reduced after several applications, and these flies were apparently exterminated after further regular spraying. The work is best carried out in the drier seasons because heavy rain washes the insecticide away. The cost is considerably below that of hand-clearing.

HOCKING (p. 810) used the method of discriminative spraying of 11,000 acres of woodland in Uganda with dieldrin for the control of *G. morsitans*. The fly concentration sites consisted of groups of acacia associated with thickets, and these were sprayed; 90% of the insecticide disappeared within 4 months. The cost was about 8 shillings per acre, and the density of *G. morsitans* was reduced by 98%—but eradication was not achieved.

Aircraft spraying of BHC was tried in Tanganyika by FOSTER (pp. 811, 924) in a *G. morsitans* area (where he obtained 90% kill of adults) and a *G. swynnertoni* area (96% kill). *G. morsitans* puparia were introduced into the *G. swynnertoni* area before spraying, and 98% of old males developed from these were killed by the spray, and the population did not recover to pre-spraying levels after 4 months. In the *G. morsitans* area a later spraying with dieldrin was carried out and 97% of old males were killed. Satisfactory control may be obtained by spraying at intervals of 4 weeks. YEO and SIMPSON (p. 811) similarly calculate that intervals of 4 weeks are satisfactory.

An account of the game elimination programme followed in Uganda since 1944 is given by ROBERTSON and BERNACCA (p. 700) who show that in about 13 years 4,800 square miles of valuable cattle country had been reclaimed from tsetse, and good progress continues in 1,500. Among the animals destroyed were numerous bushbuck—a favoured host for *G. pallidipes*. The cost was much less than that of control by bush-felling.

ESTEVES DE SOUSA (p. 1224) uses certain butyl esters, and diesel oil, for preventing regeneration of plant growth from stumps left after clearing.

ANIMAL

TOBIE (p. 136) describes the cultivation of *T. congolense in vitro*.

WRAGG *et al.* (p. 281) report that the new trypanocidal drug metamidium has considerable curative and prophylactic action against *T. congolense*. BAUER (p. 281) discusses the mode of action of Berenil (4:4′-diamidino-diazoaminobenzol) in *T. congolense* infections. It is probably connected with glucose metabolism. GOBLE and BOYD (p. 927) discuss the action of certain tetrapyrrole derivatives in experimental *T. congolense* infections.

Animals may be immunized against various reticulo-endothelial organ extracts, and GOBLE *et al.* (p. 136) observed that when sera from immunized animals were inoculated in low doses into animals infected with *T. congolense*, the survival time was increased, but in high doses death occurred more quickly than in controls. There was no effect in *Plasmodium berghei* and *T. gambiense* infections.

SQUIRE (p. 925) studied the infectibility of *G. palpalis* and *G. tachinoides* with *T. vivax*.

In rats *T. equiperdum* infection is always fatal, and immunity is not provoked; CANTRELL (p. 701) found that treatment with cortisone slightly increased survival time.

HOARE (p. 926) has issued a revision of *T. dimorphon*.

AMERICAN TRYPANOSOMIASIS

Epidemiology: Transmission

WALTON *et al.* (p. 702) have isolated *T. cruzi* from raccoons as far north as Maryland, and they note that this is within the range of 2 known vectors of Chagas's disease. Similarly it has been isolated from raccoons and other animals in Georgia and Florida, but there triatomid bugs are scarce, and infection is possibly transmitted by the urine of infected opossums. BIAGI *et al.* (p. 1013) describe a focus of Chagas's disease in Mexico, where *Triatoma phyllosoma pallidipennis* was found, heavily infected, in many of the houses.

Young farm animals infected with *T. cruzi* show a low-grade parasitaemia, without clinical manifestations, and DIAMOND and RUBIN (p. 283) think that they may serve as reservoir hosts.

LUMBRERAS *et al.* (p. 1013) investigated allergic reactions after the bites of reduviid bugs, finding that sensitization occurred to the saliva of the bugs. Bites on the eyelids of sensitized persons produced oedema similar to that of Romaña's sign, except that in Chagas's disease the oedema lasted rather longer. It is suggested that the immediate reaction caused by the bug may favour penetration by *T. cruzi* and its spread in the lymphatic system.

HIDALGO (p. 521) reports on the triatomids of part of Peru; but there is no evidence of Chagas's disease there. TEJADA and LLANOS (p. 1013) report, for the first time, the presence of *T. infestans* in the city of Lima, Peru. DE BUSTAMANTE (p. 20) discusses the distribution of the vectors of *T. cruzi* in Brazil, of which *Triatoma infestans* is the most highly infected. He notes that the incidence of cardiac forms of Chagas's disease is not uniformly associated with a high incidence of disease in man or high infection rates in bugs. BHC is recommended for control.

In the State of Goiás, Brazil, DE CARVALHO and VERANO (p. 21) found triatomid bugs in all parts except the north; *T. infestans* is the important vector of *T. cruzi*, and *P. megistus* and *T. sordida* are of secondary importance. BHC is effective in control. DE LUCENA (p. 424) reports a survey of 18,000 houses in Pernambuco, Brazil, to determine the distribution of triatomid bugs. *P. megistus* is by far the most common. In part of Ceará, Brazil, *T. brasiliensis* was the most common triatomid found by DEANE and DEANE (p. 425); it lives in hot, semi-arid plains, whereas *P. megistus* (the next in frequency) prefers cool, humid, forested mountain regions.

Aetiology

T. cruzi can persist alive in killed infected triatomids for 9 days (DE LUCENA, p. 21).

MEYER *et al.* (p. 137) describe the fine structure of *T. cruzi* as seen in the

electron microscope. VON BRAND *et al.* (p. 927) discuss the chemical composition of the culture form of *T. cruzi*.

ADLER (p. 520) describes septa which form during the development of *T. cruzi in vitro* when specific immune serum is present. He (p. 598) observed the effect of specific serum on *T. cruzi* by adding it to a culture, in which it caused immobilization and clumping. When *T. cruzi* was grown in medium containing the serum the flagellates formed irregular masses with or without cell boundaries and flagella, and later large syncytia with hundreds of nuclei. He discusses the further development of these.

Immune bodies against crithidial forms of *T. cruzi* are found in normal chickens; WARREN and BORSOS (p. 1225) discuss the nature of these bodies.

Clinical Findings: Treatment: Control

PINTO and FALCÃO (p. 703) found high alpha-2 and gamma globulins in Chagas's disease; the electrophoretic pattern is, however, different from that of kala azar.

ROMAÑA and DE ROMAÑA (p. 138) find that in chronic Chagas's disease the complement-fixation test is a much more sensitive diagnostic test than xenodiagnosis, but add that a single negative result does not exclude the disease. KNIERIM (p. 1117) used the 50% end-point complement-fixation test in subjects with or suspected of having Chagas's disease; it was positive in a number in whom xenodiagnosis was negative.

VEGA and FIORILLO (p. 138) found that a positive test for C-reactive protein was not of significance in chronic Chagas's disease.

ALZUGARAY *et al.* (p. 283) comment on the high incidence of Chagas's disease in Argentina, and on the high rate of cardiac involvement, which they discuss. Although serological tests indicated a high incidence of Chagas's disease in the State of Rio Grande do Sul, Brazil, electrocardiographic examination did not suggest that chronic myocardial affections were much more common in infected persons than in non-infected persons (BRANT *et al.*, p. 22). The pathogenesis of chronic myocarditis in Chagas's disease is obscure, and TORRES and TAVARES (p. 1015) think that the frequency of infection may be a factor. They repeatedly infected monkeys, therefore, and examined their hearts, which showed diffuse interstitial myocarditis with cellular infiltration but only scanty leishmanial forms of *T. cruzi*; this was not associated with the disseminated myocarditis characteristic of the chronic human disease. The myocardial changes in the monkeys were more marked when intervals between infections were short; they were only slight when the intervals were long, which suggests the development of immunity.

PACKCHANIAN and ROBINSON (p. 284) have devised an electrocardiograph apparatus which can be used for mice, and they have found some indication of changes characteristic of infection with *T. cruzi*.

BRENER and PELLEGRINO (p. 1117) report some action of 2-acetamido-5-nitrothiazole in experimental *T. cruzi* infection of mice.

DE BUSTAMANTE *et al.* (p. 139) found BHC more effective than dieldrin against *T. infestans* in Brazil, though the reverse had been reported in Venezuela. DIAS and DIAS (p. 599) have practically exterminated triatomid bugs in a district of Brazil, by using BHC on a large scale.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

SPITZ, A. J. W. **Malaria Infection of the Placenta and its Influence on the Incidence of Prematurity in Eastern Nigeria.** *Bull. World Health Organization.* Geneva. 1959, v. 21, No. 2, 242–4.

This investigation relates to 591 confinements of African women attending maternity homes in the Nsukka Division of Eastern Nigeria. In each case thick blood films were taken immediately after delivery from the maternal side of the placenta and from the heel of the newborn baby.

In 23·7% of the women malaria parasites were seen in the placental smears, the majority being *Plasmodium falciparum*. The mean birth weight of the babies with infected placentae was 2,851 gm., as compared with 2,940 gm. in babies whose placental smears were negative.

In a series of confinements from which first-born babies and those from seventh parity onwards were excluded 23·9% of babies with infected placentae were premature, compared with 14·3% in those in whom the placentae were non-infected.

The above findings support those of previous workers that malarial infection of the placenta is a cause of low birth weight in Africans in Nigeria [this *Bulletin*, 1953, v. 50, 596; 1957, v. 54, 781; 1959, v. 56, 4]. It is estimated that in Nsukka, malaria may account for the premature birth of about 9% of all infants.

In none of the blood smears taken from the 576 babies examined during this investigation were malaria parasites found, thus confirming the findings of others that congenital malaria is a rare event, occurring only when there is some serious breakdown in the protective barrier of the placenta. *G. Covell*

NAGARAJA, B. S. **An Investigation of *Plasmodium vivax* Infection in an Infant, 3½ Months Old, in a Protected Labour Colony at Antharagange, Shimoga District, Mysore State.** [Research notes.] *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1958, July, v. 6, No. 4, 127–9.

Plasmodium vivax was found in a blood smear taken from an infant aged 3½ months, born in a labour camp which had been sprayed with DDT twice each year during the previous 3 years. She had been found to have parasites in the first instance when she was 2 months old, but had experienced febrile attacks at intervals from the 9th day onwards. A blood smear taken on the 18th day had been returned as negative. The present finding was recorded during a routine survey. The mother, who had been absent from the camp for some weeks during her pregnancy, gave a history of fever accompanied by rigors for about 15 days before the birth of her child. Malaria parasites were also found in blood smears taken from 1 other

infant, 4 children and 3 adults, but all of these were recent immigrants to the camp.

The author concludes that the case reported was probably one of congenital malaria. [To the abstracter the evidence adduced appears to be far from conclusive.] *G. Covell*

BASU, P. C. **A Note on Malaria and Filariasis in Andaman and Nicobar.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1958. Nov., v. 6, No. 6, 193–206, 2 maps.

Mosquito control by DDT spraying has been practised in South Andaman since 1951. The other 2 major islands in the group, Middle and North Andaman, have been similarly treated since 1952 and 1954 respectively. In the Nicobar Islands mosquito control was begun in 1956. The survey now reported was carried out in South Andaman and certain of the Nicobar Islands in 1958.

In South Andaman spleen and parasite rates were completely negative among the children living in a group of 8 villages in which the combined spleen rate had been recorded as 22·5% in 1926. In the Nicobars a spleen rate of 10·2% and a parasite rate of 1·0% were recorded among the children of 4 villages which had shown high figures in surveys conducted before the commencement of the spraying campaign.

A filariasis survey in South Andaman involving 73 persons showed an infection rate of 10·9%. No previous figures were available. In the Nicobars the infection rate in 1956–57, when 15% of the population were examined, was 4%, while in the 1958 survey the rate was 7% out of 85 persons examined. In both groups of islands the sole species found was *Wuchereria bancrofti*. The mosquito fauna of the islands is listed. The author notes that in South Andaman filariasis infection is likely to be imported from the mainland. He believes that extension of the National Programme of Malaria Eradication to both groups of islands would be successful. *G. Covell*

PETERS, W. **Liver Enlargement and Malaria in New Guinea.** *Trop. & Geograph. Med.* Amsterdam. 1959, Sept., v. 11, No. 3, 219–22, 2 figs.

The author [*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1957, v. 51, 284] drew attention to the fact that hepatomegaly is common in certain areas of the New Guinea highlands in the virtual absence of malaria, and at the same time OOMEN [this *Bulletin*, 1957, v. 54, 993] remarked upon the relationship between the liver, malaria and diet in Papuan children. Probably children on a better diet have lesser degrees of enlargement than those on a poorer diet.

In the course of surveys carried out in the holoendemic Maprik area of the Sepik District, in the hyperendemic coastal regions of the Fly river and of Milne Bay, as well as in the malaria-free region of Wabag (Territory of Papua and New Guinea) records were kept of liver enlargement.

The relationship is shown in a figure between hepatomegaly, splenomegaly

and liver size. The Highland figures were obtained from Wabag (2,320 metres) in the Western Highlands. The coastal figures are a combination of data from the Fly river and Milne Bay, both hyperendemic areas at a maximum altitude of 30 metres.

The Wabag highlanders are practically vegetarian. Their basic diet is sweet potatoes, taros, leaf vegetables and fruits. The Fly river and Milne Bay people consume a greater variety of foods and have access to more protein foods, such as fish, wild pig and flying fox, yams, taro and sago. In the Maprik area yams form the staple diet.

From the data collected the author has been able to show that both the hepatomegaly rate and liver size increase as the spleen size increases. It is concluded that an increase of the malaria burden produces an increase in the rate and degree of liver enlargement, and this confirms the findings of BLACK [this *Bulletin*, 1955, v. 52, 606 *bis*]. *Philip Manson-Bahr*

BRODY, J. A. & DUNN, F. L. **Malaria Surveillance in the United States, 1958.** *Amer. J. Trop. Med. & Hyg.* 1959, Nov., v. 8, No. 6, 635–9, 1 fig. [10 refs.]

In the United States total malaria eradication is in sight despite an abundant potential vector population. In 1958 only 7 autochthonous examples of the disease were seen—4 of which were induced by blood transfusion—among a total of rather less than 100 cases of malaria. The progress of malaria control is illustrated by the following total annual figures:—1935 > 150,000, 1945—60,000, 1955—522, 1957—132.

Infection due to *Plasmodium vivax* was diagnosed in 53 instances, *P. malariae* in 6 and *P. falciparum* in 1. Of the non-indigenous infections the majority seen in servicemen had been acquired in the Far East, Korea or the Philippines, while 7 civilians had apparently been infected in Mexico. In that country also malaria is said to be declining [see ALVAREZ AMÉZQUITA, p. 451, below].

The 3 autochthonous, naturally acquired infections were investigated in detail. The first, a *P. vivax* infection in a girl of 10 years, was diagnosed in Sacramento County, in California. The second, also by *P. vivax*, in a man aged 54, occurred in Arizona, while the last, of undetermined species, was acquired by a 39-year-old man in Pennsylvania.

The detection of the source of one of the infections transmitted by transfusion makes interesting reading. The donor was a 28-year-old immigrant from Puerto Rico, who, though resident in the U.S.A. since 1952 and asymptomatic at the time of donation, was found to have *P. malariae* in his blood. The blood had been refrigerated for 24 hours before infusion. In 2 of the remaining instances, one a *P. vivax* and the other a *P. malariae* infection, multiple transfusions precluded identification of the infecting donor; the fourth instance was reported without detail from Hawaii.

The authors give a stern warning against complacency in view of the persistence and wide prevalence of the anopheline population and the considerable annual influx of potentially infected persons. [The possibility of transfusion-induced malaria in Britain should always be borne in mind.]

[See also this *Bulletin*, 1960, v. 57, 5.] *J. H. Walters*

ARAGÃO, M. B. Algumas medidas microclimáticas, em mata da Região "Bromélia-Malária", em Santa Catarina, Brasil. I. Temperatura do ar, umidade relativa e evaporação. [**Some Microclimatic Measurements in a Forest of the "Bromeliad-Malaria" Region of Santa Catarina, Brazil. I. Air Temperature, Relative Humidity and Evaporation**] *Mem. Inst. Oswaldo Cruz*. 1958, Dec., v. 56, No. 2, 415–51, 8 figs. & 67 graphs. English summary.

The paper is profuse in its tables and graphs showing changes from month to month throughout a year in environmental conditions in a forest near the town of Brusque, in a bromeliad-malaria region of Brazil. The observations are interesting because of being in the forest at several sites—representative of ground, canopy and intermediate levels in a valley and on the slopes and top of the adjacent hill.

No data are given in this first paper on bromeliad-breeding *Anopheles* in relation to the physical factors reported. *D. S. Bertram*

BEKLEMISHEV, W. N., DETINOVA, T. S. & POLOVODOVA, V. P. **Determination of Physiological Age in Anophelines and of Age Distribution in Anopheline Populations in the U.S.S.R.** *Bull. World Health Organization*. Geneva. 1959, v. 21, No. 2, 223–32, 4 figs. [50 refs.]

An article by GILLIES [this *Bulletin*, 1958, v. 55, 713], based on his translations of Russian work on means of determining the age of individual mosquitoes, provided a stimulus to others concerned in various parts of the world with problems of mosquito biology and the control of mosquito-borne diseases by insecticides in which the age of the insects was of special interest. The present paper now recounts, in some ways in greater detail and scope, this same topic. Interest arises especially from the fact that these 3 authors have themselves contributed so much in the fundamental Russian investigations on which the technique and its applications depend.

The technique, briefly, is that of exposing by fine dissection of females the foci of former eggs in the ovarioles, recognizable as dilatations of the posterior narrow tubular length of each ovariole and containing traces of the former follicles [follicular relics]. Application to biological and control problems centres on each such dilatation representing a gonotrophic cycle of known duration, so that the product of this time factor and the numbers of these residual foci is a measure of the age of the mosquito. Various details are discussed, including how to dissect to find the dilatations. Applications refer in particular to those of Russian workers who have found the method useful for all forms of the "*maculipennis group*" in the U.S.S.R., *A. superpictus* (13 and 14 gonotrophic cycles, respectively, observed in wild females) and, to some extent at least, *A. claviger*.

An account of how changes in the tracheole distribution in ovaries is helpful in differentiating nulliparous from parous females is illustrated. This is a valuable addition to the subject-matter available in English in Gillies' translations.

There are brief textual references to these methods being applicable also to muscids, hippoboscids, tabanids, black-fly and sandfly [? *Phlebotomus*] and the

suggestion that other insects may possibly offer similar opportunities for determining their age.

Those who attended the WHO Course in Advanced Entomological Techniques Applied to Malaria Eradication at the London School of Hygiene and Tropical Medicine in 1959, given by Dr. DETINOVA, or who possess now the WHO/Mal/238 document about it, are already well informed on the subject-matter of the present paper. As a brief, highly informative, formal publication in English on the topic as a whole this paper is indeed welcome.

It may be noted, finally, that the term "gonotrophic cycle" is used to denote not just the period from a blood meal until oviposition, which is in common usage by English writers, but the entire cycle from oviposition to oviposition. The period between oviposition and the next blood meal may, however, be allowed for as about 24 hours on the average. *D. S. Bertram*

BLACK, R. R. H. **Clinical Features of Overt *vivax* Malaria seen in Australia: Infections acquired in New Guinea.** *Med. J. Australia.* 1959, Oct. 24, v. 2, No. 17, 591–3, 2 figs.

With the rising European population of Papua and New Guinea, now numbering 17,500, an increasing number of persons return each year to Australia harbouring *Plasmodium vivax* in its latent, exo-erythrocytic phase. Overt malaria developing subsequently in Australia may not infrequently be misdiagnosed as influenza, or as a respiratory infection should a few abnormal physical signs be found in the chest. The author records the features of such overt *P. vivax* malaria attacks in administrative personnel and their wives during the previous 3 years.

The taking of suppressive antimalarial drugs had been continued for periods of 2 weeks to 6 months after leaving the endemic area. The great majority of overt attacks of malaria occurred during the second month from the date of cessation of suppressive therapy, though small numbers of patients might not have an attack until 5 or even 9 months had elapsed. 11 out of a group of 21 patrol officers, who were observed for 1 year while attending a course near Sydney, developed *P. vivax* malarial relapses, and the wives of all 5 married officers thus affected also developed the disease. The patients usually sought medical advice on the first, third or fifth day of their illness, showing that a regular tertian periodicity was established from the beginning. The frequency of occurrence of symptoms is tabulated and merits little comment except that headache and shivers rather than true rigors predominated, while vomiting was unusual [in contradiction to *P. falciparum* malaria, in which it is common]. 21 of the 28 patients gave a history of previous attacks of malaria. In 11 of 21 patients in whom splenomegaly was sought a palpable degree of splenic enlargement was found, though it did not exceed Hackett Size 2 in any case. [It is not stated whether this group of 21 patients had previously experienced *P. vivax* malaria; some at least must have done so.] In patients who had had prior attacks questioning suggested that the period between previous attack and relapse, provided no primaquine was given, varied from 2 to 4 months.

Treatment of the acute attack comprised oral chloroquine in standard dosage, followed by primaquine in 14-day courses of 15 or 22·5 mgm. per day, the higher dosage being preferred. *J. H. Walters*

HALLINAN, T. C. **Drug Resistance in Malaria.** *West Indian Med. J.* 1959, June, v. 8, No. 2, 132–4.

The author, who is Medical Officer to a sugar company located in Frome, Jamaica, reports the case of an East Indian child with a *Plasmodium falciparum* infection, who failed to respond to treatment with proguanil, mepacrine and quinine, used either singly or in combination. On treating the patient for hookworm (which had been found in the faeces) with tetrachlorethylene and oil of chenopodium the fever subsided. During the next few months 12 other patients were studied, all of whom failed to respond to antimalarial therapy until hookworm treatment was given, when the symptoms promptly subsided.

From January 1949 onwards all malaria patients attending the clinic have been treated for hookworm and there has been a striking reduction in the proportion of malaria patients diagnosed as having relapsed. The standard of relapse adopted was that any patient returning with malaria within 6 months of the original treatment was considered to have a relapse and not a fresh infection.

It is suggested that infection with hookworm or other helminths is a cause of malaria being resistant to drug treatment.

[To the abstracter the evidence put forward seems insufficient to warrant such a conclusion, particularly in view of the fact that in a number of other countries where hookworm infection is almost universal there is no evidence of resistance to antimalarial drugs.] *G. Covell*

MALAYA, FEDERATION OF: MALARIA ADVISORY BOARD. **Anti-Malarial Drainage from the Point of View of the Health Officer** [SCHARFF, J. W.]. First published 1935; this edition, 1959, Nov. (edited by J. A. REID). *Circular No. 10.* pp. iv + 53, 30 figs. & 1 folding pl. Kuala Lumpur: Govt. Printer. [$2.0.]

The development of antimalarial drainage in Malaya, first practised by Malcolm WATSON in the early years of the century, was largely due to the enthusiasm of F. D. EVANS, the first antimalaria engineer in the FMS, locally known as "Drain-pipe Evans", who acquired an intimate knowledge of mosquito bionomics and devoted much of his time to the instruction of health officers in the principles of drainage technique. Thereafter, a great part of the antimosquito engineering work in that country was carried out directly by health officers, of whom Dr. Scharff, the author of the manual under review, was one of the most distinguished, particularly in respect of subsoil drainage. The confidence and skill with which he would set about the problem of draining an extensive ravine covered by virgin jungle or a swamp fed by hill-seepage with the aid of a sanitary inspector and a gang of coolies trained by himself, was most impressive.

As noted in the foreword by the Director of Medical Services, the prevention of malaria in the urban areas of Malaya is still dependent primarily on antilarval measures, and it is for this reason that Dr. Scharff's manual has been reprinted. Based as it is on the actual field experience of the author over a period of some 25 years, it cannot fail to prove of immense value to

all who are concerned with the control and eventual eradication of malaria in Malaya. It is written with the utmost clarity and profusely illustrated with excellent diagrams and sketches. [See also this *Bulletin*, 1936, v. 33, 770; 1937, v. 34, 148.] *G. Covell*

ROMERO ALVAREZ, H. & MIRANDA FRANCO, R. **Measurement of Insecticides for House Spraying.** *Bull. World Health Organization.* Geneva. 1959, v. 21, No. 2, 207–10, 1 fig.

The accuracy of 2 devices, each designed to deliver a standard weight (670 gm.) of 75% water-dispersible DDT powder, was tested under field conditions in Mexico in mid-1958. One device was a volumetric measure consisting of a calibrated galvanized iron measuring can, 11·7 cm. in diameter and 12·7 cm. high; the other was a Roman balance, designed by FRITZ and PLETSCH [see below]. This balance had been mass-produced for the Mexican eradication programme in 1956.

Over a thousand weighings were made with each instrument in various regions of the country and the measurements were subsequently checked for accuracy on a commercial balance. The results showed the volumetric measure to be highly inaccurate. The actual weights varied from 460 gm. to 709 gm. with an arithmetic mean of 581·2 gm. and a standard deviation of 46·1 gm. These figures indicate that about 95% of the volumetric measurements weighed less than the desired 670 gm. The balance was more accurate; the weights ranged between 600 and 750 gm. with an arithmetic mean of 671·46 gm. and a standard deviation of 15·30 gm. The balance also proved to be accurate when used to weigh 300 gm. of 50% water-dispersible dieldrin powder.

It is concluded that the Roman balance is practical, economical and sufficiently accurate to weigh insecticides employed in malaria eradication campaigns. *B. C. Fine*

FRITZ, R. & PLETSCH, D. J. **A Practical Device for weighing Insecticides in Malaria Eradication Programmes.** *Bull. World Health Organization.* Geneva. 1959, v. 21, No. 2, 211–14, 3 figs.

Recognizing the importance of the accurate formulation of insecticides in spraying campaigns, the authors designed a Roman balance for use in the Mexican malaria eradication programme.

The design of the balance is as follows. An iron or aluminium bar, 5 mm. × 25 mm. in cross section and 60 cm. in length, has a hole bored through its fulcrum point which is about 15 cm. from one end. A chain, from which the bar can be freely suspended, is attached through this hole. A second hole, approximately 1 cm. from the short end, holds a wire hook from which a scoop-shaped galvanized metal or aluminium weighing pan is suspended by three 24 cm. long chains. The weighing pan measures 25 cm. in length, 20 cm. in width and not more than 9 cm. in depth. A third hole, bored through the bar about 3 cm. from the long end, holds a standard weight (a fishing sinker

was originally used) which will just counterbalance the desired weight which, for the DDT water-dispersible powder, was 670 gm. A fourth hole is made at the point where the same weight (plus its hook) will just counterbalance 300 gm., which is the desired quantity for the formulation of water-dispersible dieldrin. Over 1,250 balances of slightly modified design were manufactured in Mexico City by local metal workers for 1·36 U.S. dollars per unit.

The accuracy and durability of the balance has been tested under field conditions, with satisfactory results, by ROMERO ALVAREZ and MIRANDA FRANCO [see above]. *B. C. Fine*

MARTINEZ-PALACIOS, A. La *Prueba de Muralla* un método simple para determinar la susceptibilidad de los mosquitos. [**The "Muralla" Test—a Simple Method for Detecting Susceptibility of Mosquitoes**] *CNEP Bol.* Mexico. 1959, July–Sept., v. 3, No. 3, 33–7. English summary.

The "Muralla" test is intended to detect resistance by the use of the standard WHO testing kit, by a simplified procedure. A single high concentration of each insecticide is used (1·6% dieldrin and 4 or 8% DDT). Mosquitoes are exposed continuously to complete knock-down or for 16 hours, whichever is earliest. In either case they are then transferred to clean tubes and kept for 24 hours. Counts of knocked-down insects are made at intervals of 1, 2, 4, 8 and 16 hours. Resistance is indicated by a change of the maximum knock-down period, as well as by survivors at 24 hours.

It is claimed that the method employs fewer mosquitoes than the normal procedure. Males can be used as well as females.

[The observations of knock-down at intervals do give more information from a single batch of insects. This might economize in obtaining "base line data"; but not in the subsequent checks for resistance, which are done at a single concentration in the standard WHO method. The Muralla test also fails to provide further information, such as the LC50 etc., useful for basic studies on genetics and toxicology.] *J. R. Busvine*

REHM, W. F. & GARMS, R. Zur Wirkung von Alodan auf Stechmücken. [**The Effect of Alodan on Mosquitoes**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Aug., v. 10, No. 2, 154–9, 1 fig.

The English summary appended to the paper is as follows:—

"Experimental investigations on the potency of the insecticide 'Alodan', which belongs to the dien-group, using larvae and adults of *Anopheles atroparvus* and *A. stephensi* and adults of *Culex pipiens*, yielded the following results when compared with DDT and dieldrin: Dieldrin proved most effective on both larval and adult stages, the relative potency of 'Alodan' being lowest, whereas DDT occupied an intermediate position.

"In some cases persistency of 'Alodan' was observed, the insecticide thus having an after-effect on the development of pupae and adults from larvae previously treated."

SMITH, A. & DRAPER, C. C. **Malaria in the Taveta Area of Kenya and Tanganyika. Part II. Results after Three and a Half Years' Treatment of Huts with Dieldrin.** *East African Med. J.* 1959, Dec., v. 36, No. 12, 629–43, 3 figs.

The Taveta area is the north-east section covered by the Taveta-Pare Malaria Scheme. A description of the area and of its malarial epidemiology was given in a previous report [this *Bulletin*, 1959, v. 56, 917]. The paper now presented describes observations carried out during 3½ years' treatment of huts with dieldrin, and compares them with those recorded before spraying was begun.

All huts were sprayed during the latter half of 1955 with a water dispersible powder at a rate of approximately 80 mgm. of dieldrin per square foot of wall surface. 5 subsequent sprayings were applied at intervals of 8 months at half the above dose, the last cycle being completed in December 1958. All inhabited huts with their kitchens and latrines were sprayed, the insecticide being applied to all interior surfaces and to beds and other immovable furniture, but not to outside eaves.

The effect on the density of *Anopheles gambiae* was a reduction of 88 to 97% during the first year, 79 to 92% during the second year and 91 to 97% during the third. The *A. funestus* group showed a reduction of 85 to over 99% in different places by the third year. Larval collections made during the third year showed that nearly all the remaining members of the group were *A. confusus* or *A. rivulorum*, *A. funestus* type, which was the principal vector in this area, having virtually disappeared. Spray catches in untreated huts showed that there was also a very great reduction in the actual number of mosquitoes entering houses. Further evidence of this reduction was provided by comparison of window trap and hand catches in experimental huts made before and after the 3½ years of spraying. There was no evidence of any change in the feeding preferences of *A. gambiae* or of the *A. funestus* group as the result of spraying, but there was a substantial reduction in outdoor biting on man.

Only a limited number of dissections could be done owing to paucity of material. The only instance of mosquito infection was a single gland positive specimen among 283 *A. gambiae* collected in huts in an area undergoing rapid resettlement, where a large proportion of the huts were unsprayed.

The spleen and parasite rates showed a progressive fall throughout the period of spraying. It appears however that malaria transmission has not been completely interrupted, because *Plasmodium falciparum* infections are still occasionally encountered in infants and in other children who have never left the sprayed area.

No satisfactory explanation of this residual transmission is forthcoming, but the authors suggest that in view of the striking effects of the insecticide on the principal vectors, transmission by some unidentified secondary vector is a possibility. *G. Covell*

SMITH, A. **Results of Screening *Anopheles gambiae* for Resistance to Dieldrin in the Pare Area of North-East Tanganyika.** *Bull. World Health Organization.* Geneva. 1959, v. 21, No. 2, 239–40.

During the third year of residual spraying of huts with dieldrin in the Pare area of Tanganyika [this *Bulletin*, 1957, v. 54, 917], wild-caught *Anopheles*

gambiae were screened to determine whether resistance of the type described by DAVIDSON [*ibid.*, 1958, v. 55, 1078] was present.

Adult mosquitoes of various ages were exposed to 0·4% dieldrin by means of the WHO test kit and 0·5% dieldrin with the BUSVINE and NASH technique [*ibid.*, 1953, v. 50, 1176]. The latter treatment killed all the mosquitoes (1,036), but 13 out of 2,694 survived exposure to 0·4% dieldrin. Adult progeny obtained from 2 of the survivors were tested further. 43 females and 23 males obtained from one survivor were all killed when exposed to 0·5% dieldrin, as were 20 females and 27 males (from another survivor) which were tested with 0·4% dieldrin.

Davidson [*loc. cit.*] has shown that 0·4% dieldrin kills all the susceptible but none of the heterozygous or homozygous resistant *A. gambiae*. If specific resistance is present, the offspring of those individuals surviving 0·4% dieldrin should exhibit a maximum of 50% mortality at this dose. Since all the offspring of the Pare mosquitoes died at this discriminating dose, resistance of the type described by Davidson was considered to be absent. Survival of some of the original wild-caught adults was probably due to the fact that they had managed to avoid lethal contact with the dieldrin. *B. C. Fine*

KALRA, R. L. & RAJINDAR PAL. **Metabolic Degradation of D.D.T. in Resistant *A. subpictus*.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1959, July, v. 7, No. 4, 123–4. [10 refs.]

VAN DEN ASSEM, J. **Daily Mortality in Four Species of New Guinea Anophelines.** *Trop. & Geograph. Med.* Amsterdam. 1959, Sept., v. 11, No. 3, 223–36, 3 figs. & 1 graph. [14 refs.]

The author calculated daily mortality rates [MACDONALD, this *Bulletin*, 1952, v. 49, 569] for 4 species of anophelines in 3 areas of New Guinea, namely *Anopheles koliensis* (Hollandia, sprayed with DDT), *A. farauti* (Merauke, sprayed with dieldrin), *A. bancrofti* (Merauke, sprayed with dieldrin, and Kimaan, unsprayed) and *A. amictus hilli* (Merauke, sprayed with dieldrin); the last two species are stable, at least during the wet season. The author was unable to make POLOVODOVA's technique [*ibid.*, 1958, v. 55, 713] work in determination of age and he used MER's method [*ibid.*, 1933, v. 30, 304] with modifications.

Over a period of 3 months the daily mortalities for *A. farauti*, *A. bancrofti* and *A.a. hilli* were found to be respectively 32%, 31% and 5%. The significant difference in the last was probably due to ecological factors, rather than to selective killing by residual spraying.

A. koliensis is an unstable species and while short-term fluctuations in the proportions parous were found from catch to catch, there was evidence for a long term mechanism producing daily mortalities varying between 10% and 30% at different times of the year. It would seem that the daily mortality as calculated did not suggest an efficient control of *A. koliensis* as a whole; the decrease in malaria after DDT house-spraying in Hollandia was probably due to a higher mortality of mosquitoes entering houses. No variations of significance were found in the proportions parous collected in the morning and

evening. Pre-gravidity [GILLIES, *ibid.*, 1954, v. 51, 1032] was not found in the species studied: it would seem that in them the first blood meal is probably sufficient for egg development beyond stage II.

The findings are set out in 12 tables and discussed in the text: special attention is paid to *A. koliensis*. *H. J. O'D. Burke-Gaffney*

MARTINEZ-PALACIOS, A. Resistancia fisiológica a dieldrin y DDT de *A.* (*A.*) *quadrimaculatus* Say 1824, en México. **[Physiological Resistance of *Anopheles quadrimaculatus* to Dieldrin and DDT in Mexico]** *CNEP Bol.* Mexico. 1959, July–Sept., v. 3, No. 3, 31–2. English summary.

Resistance to dieldrin has already been reported in the main malaria vectors of Mexico, *Anopheles pseudopunctipennis* [this *Bulletin*, 1959, v. 56, 517] and *A. albimanus* [*ibid.*, 1960, v. 57, 221]. Both, however, are still sensitive to DDT. This paper reports double resistance of another anopheline, *A. quadrimaculatus*, to both DDT and dieldrin. The discovery was made in an area in the north eastern corner of Mexico, where only DDT has been used for house-spraying. Resistance in *A. quadrimaculatus* seems to have developed as a result of large quantities of insecticide being used for agricultural purposes, especially cotton dusting. *A. quadrimaculatus*, which is not widely distributed in Mexico, remains normally susceptible in regions not growing cotton. However, the cotton dusting does not seem to be responsible for resistance in the two other anopheline species. *J. R. Busvine*

BARRERA, A. Investigaciones sobre la efectividad del Malathion en *A.* (*A.*) *pseudopunctipennis* de la Zona Morelense de resistencia al dieldrin y en *A.* (*N.*) *albimanus* de insectario y de la Costa Grande de Guerrero. **[Studies on the Efficacy of Malathion on *Anopheles pseudopunctipennis* from a Dieldrin-Resistant Zone in Morelos, Mexico, and on *A. albimanus* from the Laboratory and from Guerrero]** *CNEP Bol.* Mexico. 1959, July–Sept., v. 3, No. 3, 18–30. English summary.

The appearance of dieldrin resistance in malaria vectors in Mexico has given concern to the authorities, since there is only one practical alternative at present, namely DDT. Further alternatives are highly desirable, in case DDT resistance also develops. Accordingly, tests were done with malathion, which is one of the safest organophosphorus insecticides.

In preliminary laboratory tests, malathion was sprayed on to blocks of various materials such as dried clay, adobe, etc. Mosquitoes (either resistant wild *Anopheles pseudopunctipennis* or susceptible laboratory-reared *A. albimanus*) were exposed to the treated surfaces for half-hour periods and mortalities estimated 24 hours later. Results were poor, much of the toxicity being lost 48 hours after spraying in most cases. In some other tests, with *A. albimanus*, for bioassay of various materials, the mortalities fell off completely 6 days after spraying.

Other tests were conducted in sprayed houses in the field. Mosquitoes were exposed on various surfaces inside these houses. Fairly high kills (70 to 100%) were obtained in the first week only; by the 6th week all activity was

lost, except on wooden surfaces. [*Cf.* MATHIS and SCHOOF, this *Bulletin*, 1959, v. 56, 803; also REID and LIM, *ibid.*, 1290.] *J. R. Busvine*

ALVAREZ AMÉZQUITA, J. La erradicación del paludismo en México. [**Eradication of Malaria in Mexico**] *CNEP Bol.* Mexico. 1959, July–Sept., v. 3, No. 3, 3–17, 8 figs. English summary.

Previous reports [this *Bulletin*, 1957, v. 54, 1157; 1958, v. 55, 372] have recorded the progress made by the National Commission for the Eradication of Malaria in Mexico since its foundation in 1955. The present report brings the account of the second stage of the programme (total coverage and epidemiological evaluation) up to June 1959. The history, organization, finances, administration, educational measures and actual operations are again reviewed and results fully set out in several tables, figures and graphs. There is a map showing the extent of the infected area of the country in 1957 and 1958, and another figuring the 14 zones of operation. Morbidity, mortality and the percentage of positive blood films are shown in graphs and tables.

The fifth consecutive cycle of spraying in the malarious area was completed in June 1959 and the sixth began in July. 3½ million houses are now being treated, bringing the total number of house-sprayings from the beginning of the campaign up to 14 million, with a consumption of some 7,000 tons of insecticide.

As a result, malaria morbidity has fallen from an average of 186·1 per 100,000 in 1950–1954 to 21·9 in 1958 and mortality from 90·8 to 16·5. The percentage of blood films positive for malaria parasites before spraying began in August 1956 was 10·1% and this has fallen steadily to 0·4% in June 1959. In several areas, no cases of malaria have been recorded since the second half of 1958, though in some the disease had tended to persist.

The very favourable modification of the malaria picture has been highly encouraging to the people in rural areas, whose sense of well-being has increased and who now show a greater capacity for work.

Other problems being studied are the effects of the insecticides and their toxicity, habits of local anophelines and possible development of resistance to insecticides.

This very encouraging report reflects great credit on the work of the Commission. *H. J. O'D. Burke-Gaffney*

CORRADETTI, A., VEROLINI, F. & ROSTIROLLA, Marta. Durata della sopravvivenza di *Plasmodium berghei* nel pipistrello insettivoro italiano *Miniopterus schreibersii*. [**Length of Survival of** *Plasmodium berghei* **in the Italian Insectivorous Bat** *Miniopterus schreibersii*] *Riv. di Parassit.* Rome. 1959, Dec., v. 20, No. 4, 255–7.

The English summary appended to the paper is as follows:—

"*Plasmodium berghei* transmitted by blood inoculation to the bat *Miniopterus schreibersii* does not show any evidence of progressive multiplication in this experimental host. The experiments of subinoculation to mice demonstrate that *P. berghei* survives in the blood of *M. schreibersii* from 24 to less than 72 hours."

DEMINA, N. A. Contribution à l'étude de l'influence du régime nycthéméral de l'hôte sur l'évolution de la multiplication de *Plasmodium relictum*. [**Study of the Effect of Nycthemeral Conditions of the Host on the Developmental Rhythm of** *Plasmodium relictum*] *Riv. di Malariologia*. 1959, June, v. 38, Nos. 1/3, 27–44. [25 refs.] English summary.

The author had previously shown (*Med. Parasit. & Parasitic Dis.* Moscow, 1953, v. 22, 41) that by artificially reversing day and night conditions, the development of a Moscow strain of *Plasmodium relictum* (obtained from *Parus major*) could be changed so that maturation of the schizonts took place at night instead of about 10 o'clock in the morning. Now she tries to determine whether the inoculation of the altered strain at the "wrong" hour into a new bird would result in the preservation of the abnormal rhythm or in a reversion to the corresponding day/night situation.

The altered strain was first used in the refrigerated state (4°–6°C.) in order to have the parasites at the appropriate stage of development at a given time. As a preliminary experiment, parasitized blood in the normal state was taken and inoculated into (a) canaries immediately, (b) canaries after 12 hours' cooling and (c) canaries after 24 hours' cooling. (a) and (c) should have behaved the same as regards the timing of the schizogony cycle, and this in fact took place; (b) might have given the reversal of schizogony maturation, but in fact only showed a slight disturbance in the normal degree of synchronicity.

Next she inoculated canaries with infected blood, (a) the normal strain, and (b) the reversed strain, and then exposed the infected birds to normal and abnormal day and night conditions. Both strains assumed the normal synchronicity when exposed to the normal regime, but the abnormal strain reverted to the normal rhythm more quickly. *P. C. C. Garnham*

DUNCAN, D., STREET, J., JULIAN, S. R. & MICKS, D. O. **Electron Microscopic Observations of the Gametocytes of a Malarial Parasite** (*Plasmodium cathemerium*). *Texas Reports on Biol. & Med.* 1959, v. 17, No. 3, 314–22, 6 figs.

A description is given of the structure of gametocytes in the avian parasite, *Plasmodium cathemerium*, as seen by electron microscopy. The material was presented by infected canary blood, which was fixed *in toto* in 2% osmium tetroxide for 20–30 minutes, passed through ascending strengths of alcohol and embedded in methacrylate, after which thin sections were collected on copper grids and photographed in an electron microscope. In sections it was seen that gametocytes are invested in a thick three-layered membrane, whereas in trophozoites the latter is thin and consists of two layers. Both sexual and asexual forms contain mitochondria, those of the former being smaller than in the latter. All the parasites contain a nucleus with an inconspicuous membrane and a nucleolus. The microgametocytes may possess a vacuolated Golgi apparatus, whereas the macrogametocytes contain ribonucleoprotein granules in the cytoplasm.

The structures in question are shown in a series of photomicrographs.

C. A. Hoare

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

FROMENTIN, H., KORACH, S. & SANDOR, G. Variations du taux des différentes formes du cholestérol sérique dans la trypanosomiase expérimentale aiguë du rat blanc. **[Variations in Level of the Different Forms of Serum Cholesterol in Acute Experimental Trypanosomiasis in Albino Rats]** *Ann. Inst. Pasteur.* 1960, Jan., v. 98, No. 1, 161–4, 1 fig.

This report is a continuation of an earlier study on the serum changes in rats with acute *Trypanosoma gambiense* infections (Yaoundé strain). In the present investigation the types of cholesterol—esterified, free and total—have been studied. Of a total of 56 rats of weight 150 gm. 11 served as controls. The infection was invariably lethal for the host. By using acute infections the authors avoided the complications of serological changes occurring during the crisis. Estimations were made separately on the serum of each animal.

The infection was characterized by a fall in level of esterified cholesterol and an increase in the free form involving an overall fall of total cholesterol, so that the ratio of esterified cholesterol to total cholesterol was lowered and the ratio of the free to the esterified form was increased.

The authors conclude that "The results of the investigation suggest the existence of a stress phenomenon inducing the utilization of cholesterol esters for the synthesis of corticosteroids". *J. D. Fulton*

WILLIAMSON, J.; ROLLO, I. M. **Drug Resistance in Trypanosomes;** [i] **Cross-Resistance Analyses** [WILLIAMSON & ROLLO]. *Brit. J. Pharmacol. & Chemotherapy.* 1959, Dec., v. 14, No. 4, 423–30. [51 refs.] [ii] **Selective Interference with Trypanocidal Action** [WILLIAMSON]. *Ibid.*, 431–42, 3 figs. [78 refs.] [iii] **Effects of Metabolic Inhibitors, *p*H and Oxidation-Reduction Potential on Normal and Resistant** *Trypanosoma rhodesiense* [WILLIAMSON]. *Ibid.*, 443–55, 4 figs. [48 refs.]

i. Sub-strains of the Liverpool old laboratory strain of *Trypanosoma rhodesiense* were made resistant to Atoxyl, acriflavine, melarsen, stilbamidine, Surfen C, butarsen, suramin and Pontamine sky blue 5BX. The strains were then tested for their resistance to a large range of trypanocidal compounds *in vivo*, and sometimes *in vitro*. The results are summarized in a large table which must be consulted in the original. Briefly, trypanosomes made resistant to one class of compound are resistant to other members of the same class and also to some members of other classes, in a way which cannot be made to fit with any hypothesis available at present. Certainly the cross-resistance cannot be explained on the state of ionization (anionic, cationic, or approximately neutral) of the compounds at *p*H 7. Probably the compounds are first fixed by the trypanosome (stage I) and then react chemically with the cytoplasm (stage II) to cause death of the trypanosome (stage III). The alterations which take place, when trypanosomes become drug-resistant, are probably concerned chiefly with the fixation of the compound (stage I).

ii. *P*-aminobenzoic acid inhibits the trypanocidal action of butarsen (p-$OAsC_6H_4(CH_2)_3COOH$) in mice [this *Bulletin*, 1947, v. 44, 48], if it is injected intraperitoneally a few minutes before butarsen is injected. A quantitative study was made of this "interference" phenomenon; 300 molecules of aminobenzoic acid were required for the complete inhibition of one molecule of butarsen. The interference is specific for *p*-aminobenzoic acid, and replacement of either the amino or carboxyl groups greatly reduced its activity. Interference with butarsen was also exerted by certain surface-active compounds, especially palmitamidine and octadecylamine. In addition, aminobenzoic acid interferes with the trypanocidal action of Atoxyl and of two other phenylarsenicals possessing a $-COOH$ group. Two other systems of interference *in vivo* have been subjected to further study: (a) thiol groups interfering with aromatic arsenicals and (b) melamine interfering with melarsen oxide and with pentamidine.

A long discussion of the theoretical implications of these results is given. It is considered that they support the hypothesis given above that the drug first combines with a specific site in the trypanosome, and then it causes chemical reactions which kill the parasite.

iii. Many different metabolic inhibitors were tested *in vitro* for trypanocidal action on a normal and on a stilbamidine-resistant strain of *T. rhodesiense* but there were no obvious changes of specific enzymatic function in the resistant strain compared with the normal strain. Oxidation-reduction potential is believed to be an important factor in trypanocidal action but it is not related to drug resistance. The author believes that drug resistance in trypanosomes is connected with physical changes in specific cellular structures associated with the preliminary fixation of the drug by the cell, rather than with the secondary chemical reactions of the drug inside the trypanosome which follow this fixation.

[This work is a good illustration of the general experience that while only a few facts are known it is easy to frame a hypothesis to explain them; but as more facts are accumulated the less easy it becomes to fit them into the hypothesis. There is a further complication, not mentioned in this paper, that if strains resistant to a compound are prepared on different occasions, they may vary considerably in their cross-resistances. These lengthy papers and equally lengthy discussions describe much valuable work; but they cannot be adequately reproduced in an abstract and they should be consulted in the original by all those interested in this subject.] *F. Hawking*

SEBASTIANI, A. Tentativi di terapia antibiotica con spiramicina, novobiocina, oleandomicina, della tripanosomiasi sperimentale della cavia da *Trypanosoma brucei*. [**Trials of Antibiotic Treatment with Spiramycin, Novobiocin and Oleandomycin in Experimental** *Trypanosoma brucei* **Infection in Guineapigs**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1959, Nov., v. 40. No. 11, 639–43. [20 refs.]

The antibiotics were without influence under the experimental conditions.

STEPHEN, L. E. & MACKENZIE, C. P. **Experimental** *Trypanosoma vivax* **Infection in the Horse.** Reprinted from *Vet. Record*. 1959, Aug. 15, v. 71, 527–31, 3 figs. [16 refs.]

CLARK, T. B. **Comparative Morphology of Four Genera of Trypanosomatidae.** *J. Protozoology*. Utica. 1959, Aug., v. 6, No. 3, 227–32, 12 figs. [16 refs.]

In this paper an account is given of the comparative morphology and cytology of the trypanosomid flagellates, which have been studied by phase-contrast microscopy. The material included culture or blood forms of *Leishmania tropica*, *Trypanosoma cruzi*, *T. lewisi*, *T. ranarum*, *T. pipientis* and *T. diemyctyli*. In all these species the author found a "reservoir" representing an invagination in the body wall enclosing the sheathed flagellum, which arises at its base and emerges from its "mouth". These flagellates also contained a contractile vacuole, typically situated at the side of the reservoir, into which its contents are discharged. On the basis of the arrangement of these structures, as well as of that of the kinetoplast and flagellum, the Trypanosomidae fall into 4 groups. In the first, represented by *Crithidia fasciculata* and *Herpetomonas oncopelti* [both of which are included by some authors in the genus or subgenus (of *Leptomonas*) *Strigomonas*], the reservoir extends to about the middle of the body and opens at the anterior end, while the kinetoplast and the starting point of the axoneme are juxtanuclear; the second and third groups, represented by *Herpetomonas muscarum* and the leptomonad stage of *Leishmania*, have a short reservoir in the anterior end of the body, the two forms differing in the shape of the anterior and posterior extremities; in the fourth group, represented by the cultural form of *Trypanosoma cruzi* [*i.e.* the conventional crithidial stage], the reservoir forms a short depression in the middle of the body, while the flagellum issuing from it runs along the edge of an undulating membrane. This form is derived from the blood form (exemplified here by *T. lewisi*), in which a similar reservoir is situated in the posterior end of the body.

Though, in addition to the [leptomonad] stage mentioned above, *Herpetomonas* has stages in which the kinetoplast is juxtanuclear [= crithidial] and posteronuclear, the author does not consider the latter form as being a trypanosome stage, because—unlike the blood form described above—it has a long reservoir extending from the "mouth" in the anterior end to the starting point of the flagellum in the posterior end of the body, and moreover it lacks an undulating membrane. *C. A. Hoare*

PICK, F. Mise au point concernant la transformation rapide *in vitro* des formes sanguines et métacycliques de *Trypanosoma cruzi* en formes leishmaniennes. [**Commentary concerning the Rapid Transformation** *in vitro* **of Blood and Metacyclic Forms of** *Trypanosoma cruzi* **into Leishmanial Forms**] *Bull. Soc. Path. Exot.* 1959, Mar.–Apr., v. 52, No. 2, 143–4.

In a previous paper [this *Bulletin*, 1958, v. 55, 139] the author described a new medium, consisting of haemolysed rabbit blood ingested by Reduviid bugs, in which transformation of blood and metacyclic forms of *Trypanosoma cruzi* into leishmanial forms was observed *in vitro*. In his comments to the abstract of this paper [*loc. cit.*], the reviewer assumed that the author regarded both processes as equivalent. In the present note the author disavows this interpretation, pointing out that he had drawn no conclusions from his experiments,

nor had he compared the leishmanial forms developing in culture from trypanosomes derived from the vertebrate and invertebrate hosts. He also emphasizes that haemolysis of the blood ingested by the bugs—which constitutes the new medium—is produced naturally, by the action of diastase, and not by any physico-chemical procedure. *C. A. Hoare*

Silva, Isabel I. Forma quística del *Trypanosoma* (*Schizotrypanum*) *cruzi*. [**Cystic Form of** *Trypanosoma cruzi*] *Rev. Facul. Med. de Tucumán*. 1958, July, v. 1, Nos. 1/2, 39–66, 2 text figs. & 131 figs. on 8 pls. [23 refs.] English summary.

As is known, the essential difference between the trypanosomid flagellates of insects (*Leptomonas*, *Herpetomonas* and *Crithidia*) and those of vertebrates (*Trypanosoma*), is the presence in the former of an encysted stage, which serves to transmit the infection from insect to insect, whereas in the blood-inhabiting forms the infective stage is represented by metacyclic trypanosomes. However, in the past a number of authors have recorded the occurrence in trypanosomes of the *lewisi* group (*e.g. T. lewisi*, *T. rangeli*, *T. cruzi*) of forms suggestive of "cysts", but none of them has produced any evidence of their viability outside the host's body. This has apparently been demonstrated by the present author in the case of *T. cruzi*, and an account of her observations is given in this paper.

Having detected, in *Triatoma infestans* infected by *T. cruzi*, the presence of cyst-like forms of the parasite, the author placed the bugs and their droppings in Petri dishes, where they were allowed to dry at 28°C. Parts of the alimentary tract (especially the rectum) of the dead bugs—some of which were kept dry up to one year—were dissected out and ground into a powder, which was mixed with defibrinated blood. Blood containing the pulverized guts was placed in small metal receptacles which were covered with fresh skin from a bird or rat. The receptacles were then inverted and fitted into glass tubes, each containing 7–10 "clean" triatomid larvae which were allowed to feed on the blood mixture through the membrane. (The arrangement for feeding and an apparatus for keeping a large number of such tubes heated at 37–40°C., are illustrated in two figures.) The fed larvae were then kept without food for one month at 26°C., after which their droppings were examined: in one experiment cysts were detected in 31 out of 168 larvae. The same method was successfully employed for infecting "clean" bugs from artificially infected donors. These experiments were repeated with infected bugs from different parts of Argentina, and it was found that in many batches cysts were absent. The cysts are typically oval [leishmanial] forms measuring 2·5–4 × 1·5–2μ. The presence of a protective membrane (cyst-wall) is inferred from the fact that some of those bodies were unstainable by Giemsa's method. In addition to cysts, the artificially infected bugs harboured crithidial and leptomonad forms, but metacyclic trypanosomes occurred only in exceptional cases and in scanty numbers. The appearance of the flagellates (including cysts) is shown in numerous figures.

A series of experiments was carried out on the viability of the cysts. It was found that they were resistant to desiccation for periods up to 2 years, since they were still capable of infecting "clean" bugs, and it was demonstrated that transmission from bug to bug was contaminative. It was shown that exposure to sunshine for one month had no deleterious effect upon the cysts, and they

remained viable when heated for one hour to 60–80°C. They were also resistant to the action of water, soapy water, acidulated or alkalinized water and 96% alcohol. In all these cases the viability of cysts was tested by infection of "clean" bugs. Finally, attempts were made to infect mice with material derived from dried cysts. It was found that these animals became infected only in the few cases when metacyclic trypanosomes were present in the inoculum, but not when it contained cysts or crithidial forms.

The author concludes that the course of development of *T. cruzi* in its vector is determined by the source of the infection, *viz.* flagellates derived from blood trypanosomes develop into metacyclic trypanosomes, whereas those derived from resistant cysts give rise to cysts again. The implication of these findings should be borne in mind in the xenodiagnosis of Chagas's disease.

[A dual life cycle, attributed here to *T. cruzi*, has also been described by REICHENOW (this *Bulletin*, 1957, v. 54, 1300) in related species. However, this phenomenon is so unusual for trypanosomes that, until more convincing evidence is produced, there will always be some suspicion that in the cases described above the cysts were produced by some monogenetic trypanosomid (*e.g. Crithidia* sp. ?) of the triatomid bugs.] *C. A. Hoare*

FERNANDES, J. F.; CASTELLANI, Olga; SILVA, L. H. P.; YONEDA, S.; PEREIRA, J. P. M. **Nucleotide and Polynucleotide Synthesis in** *Trypanosoma cruzi*. **II.** ***In vitro*** **Effect of Tioguanine and of the Aminonucleoside of Stylomycin** [FERNANDES & CASTELLANI]. *Exper. Parasit.* New York. 1959, Oct., v. 8, No. 5, 480–85. **III. Effect of the Aminonucleoside of Stylomycin on the Parasite in Tissue Culture** [SILVA, YONEDA & FERNANDES]. *Ibid.*, 486–95, 8 figs. on 2 pls. [12 refs.] **IV. Effect of the Aminonucleoside of Stylomycin on Mouse Infections** [FERNANDES, PEREIRA & SILVA]. *Ibid.*, 496–501, 1 fig. [12 refs.]

II. In the first part of this series (*Exper. Parasit.*, 1958, v. 7, 224; this *Bulletin*, 1958, v. 55, (875)), the authors have shown that *Trypanosoma cruzi* effects synthesis of purine nucleotides chiefly from pre-formed purines rather than from smaller molecules such as glutamine, glycine, formate, etc. From their studies it appeared that the parasite had only limited ability to synthesize purine or pyrimidine rings. Inhibition of synthesis by this route was effected by 6-mercaptopurine but not by Stylomycin [first known as Achromycin, then Puromycin], also a purine derivative which inhibits the metabolism of certain other trypanosomes. The effect of tioguanine and the aminonucleoside of Stylomycin on the rate of purine nucleotide and polynucleotide synthesis, with adenine 8-^{14}C as labelled precursor was studied. The rate of its incorporation into acid-soluble adenine compounds and mixed nucleic acid purines was used to study any antagonistic effect by the substances named in the title, and both exerted such an effect.

III. The rapid division of leishmania forms of *T. cruzi* suggests the need of a high purine content in host cells or of the smaller molecules [named above] if they can be incorporated into purines by the parasites. In the vertebrate host such small molecules as glycine, glutamine, etc., are probably present in abundance. The effect of the aminonucleoside of Stylomycin on *T. cruzi* in tissue culture, with the use of the hanging drop technique in Hanks-Wallace

solution, was then studied with a drug concentration of 0·26 micromole per ml. and regular daily examinations were made under phase microscopy. It appeared that the main effect of the drug was to interfere with mitotic processes in the intracellular parasite with resultant degeneration, while the effect on the trypanosome stage was less marked. The action of the drug was not antagonized by adenine, adenosine or other small molecules involved in purine synthesis.

IV. The effect of Stylomycin in other trypanosome infections has been reported previously [this *Bulletin*, 1955, v. 52, 134; 1958, v. 55, 874]. The aminonucleoside of this substance has now been tested in mouse infections of *T. cruzi*. Treatment was started on the first or sixth day after inoculation, and continued at 6-hour intervals by the subcutaneous route accompanied by small doses of penicillin, because the blood level of the drug decreased to low value within 3–4 hours. The result of drug treatment was to reduce mortality of mice to a very low level but cure was not effected. The results of *in vitro* as well as of *in vivo* studies show that the drug is active against *T. cruzi*. The search for other purine analogues for use in treatment of this infection is thought likely to lead to positive results. *J. D. Fulton*

De Lucena, D. T. Epidemiologia da doença de Chagas em Pernambuco. II. Notas sôbre as espécies de Triatomíneos. [**Epidemiology of Chagas's Disease in Pernambuco. II. Notes on Species of Triatomids**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1958, Oct., v. 10, No. 4, 355–68. [18 refs.] English summary. III. Índices de infecção dos Triatomíneos. [**III. Indices of Infection of Triatomids**] *Ibid*., 369–90, 1 map. 14 refs.] English summary.

The survey of Chagas's disease and triatomine bugs in Pernambuco in Brazil extended over the greater part of the state. Both papers are concerned mainly with the habits and distribution of the insects and their infection rates for *Trypanosoma cruzi*. It is noted that the disease is most apparent in man in the interior of the territory. Bugs of domestic habit were *Panstrongylus megistus*, *Triatoma rubrofasciata*, *T. sordida*, *T. maculata* and *T. brasiliensis* although the last two species also occurred outdoors. A few *P. lutzi* and *T. melanocephala* occurred indoors but are considered incidental invasions.

Analyses of collections, dissections and faecal examinations of some 15,000 bugs show that *P. megistus* is much the most widespread and abundant species generally, with an infection rate of 14·41% for *T. cruzi*. *T. brasiliensis* and *T. maculata* are also quite widely distributed but less numerous; infection rates for *T. cruzi* were 10·61% and 7·8% respectively, in catches of less than 3,000 specimens which, compared with the several thousands of *P. megistus* taken, indicates the relative abundance of this vector. With *T. rubrofasciata*, found in moderate numbers (542 specimens) along the coast and its hinterland districts, the infection rate with *T. cruzi* was 4·8%; three specimens harboured *T. conorhini*. Numbers taken of the other species are less than 10. *T. cruzi* was found in one *P. lutzi*, but not in the other species. A map and numerous tables supplement the text.

The general conclusion is that Chagas's disease is of importance over much of the state, particularly inland. In the first paper, it is concluded that

varieties *melanica* and *macromelasoma* of *T. brasiliensis* are not justifiable. This paper also reports briefly on an attempt to rear *T. melanocephala* as a laboratory colony. All larvae died at the fifth stage. Much of the material in the second paper has been recorded in another paper already abstracted [this *Bulletin*, 1960, v. 57, 350]. *D. S. Bertram*

Di Primio, R. Contribuição para o estudo do *Panstrongylus megistus* no Rio Grande do Sul. [**Study of** *Panstrongylus megistus* **in Rio Grande do Sul, Brazil**] *Anais Facul. Med. de Pôrto Alegre.* 1958, Jan.–Dec., v. 18, No. 1, 35–40, 1 fig. on pl.

A map illustrates the distribution of *Panstrongylus megistus* in the Rio Grande do Sul state in Brazil as forming a belt across the north of the territory from the Atlantic coast to the Argentine border. There is one separate focus to the south in the Lavras do Sul district. The bug is considered not to be adapted to fully domesticated habits but invades houses and premises only in the warmest months of the year, chiefly December and February. In winter months, notably July to October, it does not occur indoors and this is considered to be due to a cessation of feeding, a hibernation, in this period of cold, frost and snows.

In a collection of 100 bugs, 23 were examined and 16 found positive for *Trypanosoma cruzi*.

The text is brief with the map and three tables; there are no references.

D. S. Bertram

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Haseeb, M. A. **On the History of Kala-Azar in the Sudan.** 14 pp. [Numerous refs.] 1959. Khartoum: Stack Medical Research Laboratories.

Kala azar was first recorded in Africa by Laveran in Tunis in 1903. A year later Sheffield Neave described a case in Omdurman, Sudan. The various investigations carried out in the Sudan in subsequent years are outlined in the paper under review.

A commission to investigate the prevalence and cause of kala azar in Eastern Sudan was set up in 1909 and carried out researches on board the Wellcome Tropical Research Floating Laboratory for 4 years, after which research activities were based on the laboratories in Khartoum. In recent years Kirk and his colleagues have conducted a long series of investigations and have published numerous papers dealing with various aspects of the subject.

Endemic areas of the disease are found in the Kassala and Fung districts bordering on the frontiers of Ethiopia and in the Kapoeta district, while sporadic cases have been recorded in the Nuba mountains and in the western province of Darfur.

Research has been principally directed to the problems of the animal reservoir

and the insect vector, neither of which has been solved. It is believed on epidemiological grounds that *Phlebotomus papatasi* is the principal vector of oriental sore in the Northern Sudan. All attempts to discover an animal reservoir of the disease have been unsuccessful. Records of animals found naturally infected are extremely few, and the only examples mentioned in the paper are of *Leishmania* found in a cutaneous sore on a country-bred pony from Dilling in the Nuba mountains and of doubtful bodies seen in a dog at Gallabat.

The author stresses the need for further investigations on the various problems awaiting solution.

[See also KIRK, this *Bulletin*, 1956, v. 53, 1229; 1957, v. 54, 149.]

G. Covell

CHATTERJEE, A. N. & GHOSH, J. J. **Studies on the Metabolism of *Leishmania donovani*, the Causative Organism for Kala-Azar.** *Ann. Biochem. & Exper. Med.* Calcutta. 1959, Feb., v. 19, No. 2, 37–50, 4 figs. [22 refs.]

The authors have studied aerobic and anaerobic metabolism on *Leishmania donovani*, using strain and methods previously described [this *Bulletin*, 1959, v. 56, 140]. Similar studies have been reported earlier [*ibid.*, 1950, v. 47, 529; 1954, v. 51, 783].

The organism has a high endogenous metabolism, as indicated by respiratory activity and motility in absence of added substrate, for approximately 30–60 minutes. A polysaccharide was obtained from the organisms which on hydrolysis yielded glucose, galactose and arabinose. The metabolic activity of the organisms was greatest about the 3rd or 4th day of culture and at *p*H 7 to 8. The influence of ionic concentration and metabolic inhibitors on respiration was studied. Cyanide, iodoacetate, fluoroacetate and *p*-chloromercuribenzoate were very effective inhibitors. A number of different sugars were able to act as substrates and the average value of the RQ [respiratory quotient] was about 0·9. There was little anaerobic metabolism by this organism. Succinic acid was the main product of glucose catabolism under aerobic or anaerobic conditions.

J. D. Fulton

BERBERIAN, D. A. **Relationship of Mediterranean Kala-Azar to Canine Kala-Azar.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, July, v. 53, No. 4, 364–5.

Following the discovery (in 1946) of 3 cases of infantile kala azar in the North Syrian village of Kessab, near the Turkish frontier, a further 380 children were examined with negative results; 24 dogs were also examined but these again showed no clinical evidence of infection. The dogs were killed and 5 of them showed *Leishmania* in the spleen, liver and skin. Pedigree dogs in Beirut on the other hand showed the overt infection, though 110 mongrels were entirely negative.

It is suggested that immunity to the infection may be acquired by exposure to non-virulent strains (of animal origin) and that a similar epidemiological situation is also present in toxoplasmosis. [See also MANSON-BAHR, this *Bulletin*, 1959, v. 56, 928.]

P. C. C. Garnham

PELLEGRINO, J. & BRENER, Z. Reação de fixação do complemento com sangue dessecado no diagnóstico do calazar canino. [**Complement-Fixation Test with Dried Blood in the Diagnosis of Canine Kala Azar**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1958, Jan., v. 10, No. 1, 39–44, 1 fig. [13 refs.] English summary.

A useful test is described for detecting leishmaniasis in dogs in the course of field surveys. Blood is taken on to a strip of filter paper; this is dried, and at a convenient time the blood is soaked out in normal saline. This solution is then tested for the complement-fixation reaction, with the tubercle bacillus as the antigen. 7 out of 44 dogs from the state of Minas Gerais, Brazil, gave a positive reaction (6 with dried blood and an additional positive with serum obtained in the usual way); 4 dogs with leishmanial lesions on the ears gave positive reactions, both from dried blood and from serum; 4 dogs naturally infected with *Trypanosoma cruzi* also gave positive complement-fixation tests, but 90 human sera of non-leishmanial origin were negative.

P. C. C. Garnham

BRENER, Z. & PELLEGRINO, J. Reações imunológicas cruzadas em cães com doença de Chagas e leishmaniose visceral, naturalmente infectados. [**Cross Immunity in Dogs naturally infected with Chagas's Disease and Visceral Leishmaniasis**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1958, Jan., v. 10, No. 1, 45–9. [12 refs.] English summary.

The sera of 50 dogs from the state of Minas Gerais, Brazil, were tested for complement fixation, with an antigen derived from the tubercle bacillus, and 8 specimens gave a positive reaction (considered indicative of the presence of leishmaniasis). None of these 8 dogs exhibited leishmanial lesions, but 6 gave a positive complement-fixation reaction with a *Trypanosoma cruzi* antigen, 4 were positive by xenodiagnosis to this organism and 5 were positive to the precipitin test with *T. cruzi*. The sera of 4 other dogs with leishmaniasis were tested for the complement-fixation reaction with *T. cruzi* antigen and gave positive results.

These cross-reactions will obviously cause difficulty in the interpretation of serological tests in dogs [and surely in man also] in areas where both infections exist, and direct evidence will have to be sought to identify the causative organism.

P. C. C. Garnham

BRENER, Z., PELLEGRINO, J. & BATISTA, S. M. A reação de fixação do complemento com antígeno de bacilo da tuberculose no calazar humano. [**The Complement-Fixation Reaction with Tubercle Bacillus Antigen in Human Kala Azar**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1958, Apr., v. 10, No. 2, 195–8. English summary (7 lines).

The sera of 10 children and 11 adults, with kala azar, from the states of Minas Gerais and Bahia in Brazil, were tested by the complement-fixation reaction with an antigen prepared from tubercle bacilli. All gave a positive result in dilutions from 1:20 to 1:1280. Sera from cases of acute, but not

from chronic, Chagas's disease show a cross-immunity to this reaction; leprosy and tuberculosis may also give positive results in low titres. The reaction was negative in cutaneous leishmaniasis (9 cases).

P. C. C. Garnham

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

TONGE, J. I. **Brill's Disease (Recrudescent Epidemic Typhus) in Australia.** *Med. J. Australia.* 1959, Dec. 19, v. 2, No. 25, 919–21. [22 refs.]

The first case recorded in Australia is described. The patient was a Polish immigrant who had been interned during the War in an unhygienic camp in Russia where lice were common. He and several of his family suffered from an acute febrile illness soon after and one of them died of typhus. He emigrated to Australia in 1952, and the present illness developed in 1958. Full clinical and laboratory details are given. The disease was confirmed serologically. The literature on Brill's disease is reviewed.

H. J. O'D. Burke-Gaffney

See also p. 544, DÍAZ LIRA *et al.* Evaluación de una película en una población andina del Perú. **[Evaluation of a Film by People living in the Peruvian Andes]**

ZDRODOVSKII, P. F. & GOLINEVICH, E. M. **The Immunogenic Properties of *Rickettsia prowazeki* Strain E.** *Problems of Virology.* London. 1958, v. 3, Nos. 5/6, 284–8. [Translated from Russian.]

A preparation of the E strain of *Rickettsia prowazeki* produced symptomless infections (positive complement-fixation tests) when injected intraperitoneally into guineapigs in dilutions up to 10^{-6}; guineapigs which received dilutions up to 10^{-3} resisted challenge with 100,000 infective doses of the virulent Breinl strain 1 month later. A similar experiment in which the Breinl strain was used for immunization gave clinically apparent infections with dilutions up to 10^{-7} and protection against challenge (10,000 infective doses) with dilutions up to 10^{-8}. (The stock preparations of the E and Breinl strains employed in this work both had a minimum infective dose for chick embryos at a dilution of 10^{-7}.) Immunization with strain E gave significant resistance to challenge 2 days later; after 1 week, animals which had received dilutions up to 10^{-3} resisted 100,000 infective doses of the Breinl strain. *R. S. F. Hennessey*

KANEKO, K. **Studies on Sucking Lice (Anoplura) in Japan. Part IV. Taxonomical and Ecological Studies on Murine Lice.** *Japanese J. Exper. Med.* 1959, Aug., v. 29, No. 4, 251–67, 10 figs. [18 refs.] **Part V. Experimental Transmission of *Rickettsia orientalis*, *R. mooseri* and *R. prowazeki* with Murine Lice.** *Ibid.*, 269–81. [49 refs.]

IV. Data are presented on the distribution, ecology and host-parasite relationship of 12 species of murine lice occurring in Japan and its adjacent islands. A key for the identification of these 12 species is given, and the 19 species of rodent hosts and 3 species of insectivore hosts are listed with the lice usually associated with them. Observations on the seasonal infestation rate of *Apodemus speciosus* with *Hoplopleura akanezumi* and *Polyplax serrata*, in endemic areas of winter scrub typhus, showed peak infestations in March and August on Oshima Island (Tokyo) and in April and November in the Shimoda area. The lower peaks in both cases were in the early part of the year and due mainly to changes in the population of *H. akanezumi*. On Miura peninsula maximal infestation rates were found in March, July and October.

V. Experimental infection of the murine lice *Hoplopleura oenomydis*, *H. akanezumi* and *Polyplax spinulosa* was carried out by feeding on rats infected with *Rickettsia orientalis*, *R. mooseri* and *R. prowazeki*. No transmission of *R. orientalis* was obtained but *R. mooseri* was demonstrated from 3 to 22 days after infection in the two species of *Hoplopleura*. *R. prowazeki* was found to survive for 9 days in *H. oenomydis*. It was concluded that murine lice were vectors of *R. mooseri* among rats. *E. R. Nye*

WU, Chen-Lin, YANG, Chen-Sen & WU, Kwang-Hwa. [**Discovery of *Trombicula* (*Leprotrombidium*) *akamushi* var. *deliensis* (Walch, 1923) in Chekiang Province**] *Acta Entomologica Sinica*. 1959, Dec., v. 9, No. 6, 964. [In Chinese.]

FUKUYAMA, Y. [**Studies on Tsutsugamushi (Trombiculid Mites) in Ehime Prefecture**] *Shikoku Acta Med.* 1959, Sept., v. 15, No. 3, 654–70, 3 text figs. & 15 figs. on 4 pls. [44 refs.] [In Japanese.] English summary.

The author, from the School of Medicine, Tokushima University, Japan, studied the distribution of trombiculid mites in 20 areas in the Ehime Prefecture between 1956 and 1958. 21,556 trombiculid mites of 15 species in 3 genera were collected from 260 rodents of 5 species; all these are listed.

All the mites found were included in the 5 genera and 29 species already recorded from Shikoku. Seasonal data for infestation are given.

The only species of epidemiological importance found was *Trombicula pallida* believed to be the vector of the Tsurumi type of scrub typhus. It was present in Matsuyama city and Tsushima town. It was found between September and January, with a peak in November. Its rodent host is not specified in the English summary of the paper. *H. J. O'D. Burke-Gaffney*

SAITO, Y. & OTSURU, M. **Notes on Trombiculid Mites collected in Sado Island of Japan and Isolation of Rickettsia, with a Description of** *Trombicula* (*Neotrombicula*) *sadoensis* **n.sp.** *Acta Med. et Biologica.* Niigata. 1959, July, v. 7, No. 1, 65–80, 2 text figs. & 10 figs. on 3 pls. [18 refs.]

Detailed observations on the biology of trombiculid mites were carried out by the authors from 1957 to 1958 in a district in the northern part of Sado Island, which lies off the east coast of Japan. The host animals, which included birds and rodents, were shot or trapped near a hydro-electric power station. Animals which fell into an open canal leading water to the power station were also collected and examined for ectoparasites.

Over 64,000 specimens of trombiculid mites (including mites from the central and southern parts of the island) belonging to 4 genera and 11 species were collected from 181 hosts belonging to 11 species. *Trombicula pallida, T. intermedia, T. kitasatoi, T. fuji* and *T. nagayoi* were the common ectoparasites of field mice, moles and hares. *T. nagayoi* was collected in large numbers from weasels and wild hares, while only one specimen each of this species was collected from the birds *Phasianus versicolor* and *Garrulus glandarius*. *Trombicula sadoensis*, the new species which the authors describe in this paper, was abundant on moles in the mountainous north in summer, while *Gahrliepia masoni* was collected from wild hares throughout the year. The site of attachment of the various species of mites on the hosts differed; for example, on field mice they were found mostly on the ears, whereas in moles the preferred site appeared to be the dorsal proximal part of the tail. Studies on the seasonal differences in the population density of the mites showed that *T. pallida, T. nagayoi, T. japonica* and *Gahrliepia saduski* occurred during the autumn, while *Gahrliepia masoni* was collected throughout the year.

The new species, *Trombicula sadoensis*, is described and figured.

Four strains of rickettsiae were isolated from mites by inoculation of their suspensions into mice or rabbits. One of these from *Euschöngastia miyagawai* showed a positive agglutination reaction with *Proteus OXK*, but is probably different from *Rickettsia tsutsugamushi*. A second strain isolated from *G. masoni* showed a positive agglutination reaction with *Proteus OX19* and *OX2*. This strain was isolated in rabbits, and mice were shown to be resistant to it.

M. G. R. Varma

CRADDOCK, A. L. **Tick Typhus in East Africa.** *East African Med. J.* 1959, Nov., v. 36, No. 11, 580–84. [22 refs.]

This paper was read at the first annual conference of the Kenya Faculty of the College of General Practitioners in October 1957. The author surveys the history, epidemiology and aetiology of tick typhus in East Africa with considerable reference to the literature, from the early observations of GILKS (*Ann. Med. Rep. Kenya Colony*, 1920, p. 95) and CLEARKIN (*ibid.*, 1921, p. 161) to the more recent findings of HEISCH *et al.* [this *Bulletin*, 1957, v. 54, 1068; 1958, v. 55, 144]. The clinical features are outlined briefly. The full picture is now rarely seen because of early antibiotic treatment. Special note is made of the *forme fruste* [*ibid.*, 1946, v. 43, 551] and the puzzling observation originally made by Clearkin (*loc. cit.*) that the disease seems to be confined to

Europeans living in the Highlands. Gilks had suspected a tick vector as early as 1921 (*loc. cit.*), and later the rickettsial origin of tick bite fever in South Africa [*ibid.*, 1931, v. 28, 101] and incrimination of the dog tick *Haemaphysalis leachi* [*ibid.*, 1938, v. 35, 787; 1940, v. 37, 263] were subsequently reported in that country.

Meanwhile, the rickettsial origin of Kenya typhus was confirmed [*ibid.*, 1933, v. 30, 395] and a rickettsia isolated from *Rhipicephalus sanguineus* [*ibid.*, 910]. The disease was reported from neighbouring territories, but it seems to be primarily a disease of high altitudes, as in Kenya.

There is still much to be learnt about the ecology of the disease in Kenya: Heisch (*loc. cit.*) recently isolated rickettsiae from ticks captured in burrows of wild rodents and from dog ticks. He also transmitted the disease from a dog tick to an African volunteer, so that Africans are thus shown to be susceptible.

The Kenya Faculty of the College of General Practitioners is collecting information on the human aspects of the disease and the author lists questions which may be answered as a result of these investigations. These include (1) whether the disease is virtually confined to Europeans in the Highlands, (2) whether, as complement-fixation tests suggest, the causative rickettsia is the same as that responsible for tick typhus elsewhere in East and South Africa, (3) whether murine typhus also occurs in Kenya; in this connexion it is noted that ROBERTS [*ibid.*, 1940, v. 37, 260] isolated rickettsiae from rat fleas associated with a focus of human typhus, (4) whether rickettsialpox is present in Kenya, (5) why modified attacks such as *formes frustes* occur.

H. J. O'D. Burke-Gaffney

BORGHANS-DELVAUX, J. M., BORGHANS, J. G. A. & VINKE, B. **Q-Fever in the Netherlands Antilles.** *Trop. & Geograph. Med.* Amsterdam. 1959, Sept., v. 11, No. 3, 253–8.

Complement-fixation tests for Q fever antibodies were performed on 306 sera from sheep and goats in Curaçao. 27 sera (8·8%) had titres of 1 in 4 or higher, 15 of these having titres ranging from 1 in 16 to 1 in 256. Q fever antibodies were present in low titre (1 in 4) in the serum of 1 out of 19 slaughterhouse workers. Tests were also carried out on sera from 207 patients with fever, 146 of whom had signs of respiratory tract infection, but only 1 positive result was obtained. The patient (a priest) had intermittent fever and slight jaundice, but showed no significant pulmonary changes; samples of his serum showed a rise in titre (up to 1 in 64) persisting for at least 6 months. The illness was considered to be Q fever. The source of infection could not be ascertained.

R. S. F. Hennessey

ROGER, F. & ROGER, A. Influence du pH et de la concentration saline sur la dispersion de *Rickettsia burneti*. [**Influence of *p*H and Salt Concentration on the Dispersion of** *Rickettsia burneti*] *Ann. Inst. Pasteur.* 1960, Jan., v. 98, No. 1, 153–6. [10 refs.]

Suspensions of *Rickettsia burneti* showed marked auto-agglutination at alkaline *p*H values, the form of agglutination resembling that obtained with

specific antisera. The rickettsiae remained well dispersed at neutral or acid *p*H. The authors now adjust stock suspensions to *p*H 7 and add a universal indicator to enable changes in *p*H to be detected.

It was also noted that auto-agglutination occurred at neutrality and at acid *p*H levels when the organisms were suspended in hypertonic solutions.

The behaviour of *R. burneti* in relation to the water-ether interface during purification by the Craigie technique [this *Bulletin*, 1946, v. 43, 834] was not affected by *p*H or salt concentration. *R. S. F. Hennessey*

DENGUE AND ALLIED FEVERS

Downs, W. G. & Anderson, C. R. **Arthropod-Borne Encephalitic Viruses in the West Indies Area. Part I: A Serological Survey of Grenada, W.I.** *West Indian Med. J.* 1959, June, v. 8, No. 2, 101–9, 1 map.

[An abstract of this paper appeared in the *Bulletin of Hygiene*, 1960, v. 35, May. It contains considerable information on dengue.]

RABIES

Nikolitsch, M., Gildemeister, H. & Jelesitsch, Z. Die Vermehrung des Tollwutvirus in einem für die Tollwut nicht empfänglichen Tierorganismus. **[The Multiplication of Rabies Virus in an Animal insusceptible to Rabies]** *Arch. f. Hyg. u. Bakt.* 1959, Aug., v. 143, No. 5, 357–65, 2 figs. [11 refs.]

26 domestic pigeons were infected intracerebrally into the left hemisphere with street rabies virus and the subsequent fate of the virus was investigated by the intracerebral inoculation of mice with suspensions of each hemisphere from brains removed from pigeons killed at intervals after infection. Virus was not found on the 1st and 2nd days after infection, but appeared in small amounts in the left hemisphere on the 3rd day and was found at all times thereafter up to the 11th day and in the right hemisphere on the 5th and 7th and thereafter. No virus was recovered from a pigeon killed after 6 weeks, and 2 others remained well over a period of 5 months. The brains of the pigeons showed histological evidence of infection after 4 days in the form of perivascular infiltration and proliferation of glia, but no Negri bodies could be found.

It is concluded that rabies virus will multiply in the brain of the pigeon without producing any signs of illness, and it is postulated that the damage to the neurones in animals susceptible to rabies is brought about by an exotoxin produced by virus multiplying in glia cells. [The evidence for the multiplication of rabies virus in the brain of the pigeon is not convincing as no titrations were carried out.] *D. J. Bauer*

SADLER, W. W. & ENRIGHT, J. B. **Effect of Metabolic Level of the Host upon the Pathogenesis of Rabies in the Bat.** *J. Infect. Dis.* 1959, Nov.–Dec., v. 105, No. 3, 267–73, 1 fig. [12 refs.]

The temperature of the resting bat is that of its environment, and its metabolic rate thus varies with external temperature. When bats of the species *Antrozous pallidus* were inoculated intracerebrally with rabies virus and then held at different temperatures, a straight line relationship was observed between the reciprocal of the incubation time and ambient temperature, and this ran parallel with thyroid activity, measured by iodine uptake. Incubation time also varied with season, apparently reflecting a factor not directly influenced by temperature. No virus was detected in the brains of bats held at 4°C., but the virus was able to multiply at this temperature if previously established. When bats were inoculated and held at 22°C. for 6 days before being transferred to 4°C., virus developed in their brains, but to a lower titre than in those still held at 22°C.

Some bats survive natural infection with rabies virus, since neutralizing antibodies have been detected in their sera. Experiments in which infected bats were held alternately at 30°C. and 4°C. for short intervals suggested that daily hibernation probably does not play a part in the ability of these individuals to recover from rabies. However, prolonged hibernation may well do so, for although the virus does not multiply in the brains of bats resting at 4°C., it may stimulate the formation of antibodies. *Janice Taverne*

SAVAGNONE, L. & FALGARES, E. Ricerche sperimentali e dati clinico-statistici sulla efficacia del vaccino prodotto dall'Istituto Antirabbico di Palermo. [**Experimental Studies and Statistical Clinical Data on the Efficacy of the Vaccine Produced in the Anti-Rabies Institute in Palermo**] *Riv. Istituto Sieroterap. Ital.* 1959, Nov.–Dec., v. 34, No. 6, 457–66.

The English summary appended to the paper is as follows:—

"Potency of anti-rabies phenol inactivated vaccine (Fermi type) has been experimentally tested by the techniques used by Bequignon at the Pasteur Institute, Paris.

"The results show the vaccine has a high immunizing activity, although of short duration.

"This fact is confirmed by the very low percentage of failures observed in the last five years in the practice of anti-rabies prophylaxis (2 cases out of 2878 patients treated after bites of rabid animals)."

NETTER, R., BRUMPT, V. & KONG KIM CHON. Essai de vaccination de l'homme au moyen d'un vaccin antirabique phéniqué à 0·25%. [**Attempts at Antirabic Vaccination of Man by means of a Vaccine containing 0·25% Phenol**] *Ann. Inst. Pasteur.* 1960, Jan., v. 98, No. 1, 157–9.

On persons receiving post-exposure treatment the presence of phenol in the anti-rabies vaccine employed is known to exert certain unpleasant effects, pain often persisting for days at the sites of injection and local erythematous reactions of

varying intensity. In order to minimize such ill-effects the phenol content of the vaccine has been progressively reduced from the 1% originally advocated by FERMI to a level found to be compatible with complete inactivation of the virus and sterility of the product, *viz.*, 0·25%. Thus, in this respect, in the United States the minimum requirements of the National Institutes of Health prescribe that phenol concentration in the finished product should not exceed 0·25% for vaccines containing 10% or less of brain tissue and that, in addition, with respect to preservative, 1 in 10,000 of thiomersal may be used. The results obtained from the use of a vaccine lot with low phenol content in the treatment of persons at risk are given in the present article.

The trial lot, kept at a temperature of 31°C. and in the dark for 8 days after preparation and then stored at + 4°C., proved, on test, to be completely sterile, to be wholly inactivated and to possess, to the same degree as did vaccine containing 0·5% phenol, a very much higher LD50 of protection than that (1,000 LD50) required to meet the minimum standard recommended by HABEL [*World Health Organization: Monograph Series* No. 23, p. 113; this *Bulletin*, 1954, v. 51, 1242]. Moreover, with respect to this trial lot, complete sterility was achieved without the use of thiomersal and the period required for inactivation was no longer than that for vaccine containing 0·5% phenol, despite the fact that on final titration (by the colorimetric method of THEIS and BENEDICT) its phenol content was shown to be but 0·21%.

The authors used this vaccine containing 0·21% phenol for the treatment of 27 persons (19 Cambodians and 8 Europeans). The injections were well tolerated. Local reactions, occurring between the 5th and 8th injections in 12 of the patients, mostly among adults, were minimal and disappeared in a few days, except in an obese patient, a woman, who developed at the sites of injection non-painful subcutaneous nodules, which persisted several days after the completion of treatment. In comparison with these findings, the percentage, intensity and duration of local reactions among persons treated with vaccine containing 0·5% phenol showed, in the authors' experience, a very definite increase. General reactions—fever, headache, pains and stiffness in the joints—occurred among 5 of the Cambodian patients between the 6th and 8th days of treatment, but are probably not attributable to the presence of phenol in the vaccine.

Vaccine containing 0·25% phenol has thus been shown experimentally to possess the same innocuity and efficacy as one containing 0·5% phenol and, when used in the post-exposure treatment of man, to be much better tolerated than the latter. *G. Stuart*

STIRBU, A., STOIAN, I. & HEYTMANEK, Constanța. L'influence des conditions de conservation sur les propriétés immunogènes du vaccin antirabique. **[The Influence exerted by Storage Conditions upon the Immunogenic Properties of Rabies Vaccine]** *Arch. Roumaines Path. Expér. et Microbiol.* 1959, Sept., v. 18, No. 3, 391–404, 4 graphs. [17 refs.]

To determine the influence exerted by certain inactivating factors—temperature, phenol and period of storage—on the immunizing potency of an antirabies vaccine prepared from brain material of known virus titre was the object of the experiments described in this paper. The experiments were performed on

white mice of 12–14 gm. weight. The vaccine, a 5% tissue suspension in 1% phenolized physiological salt solution of emulsified brain from sheep inoculated with the Babès strain of fixed virus, was inactivated by exposure to a temperature of 37°C. for 2 hours. For immunization mice were given intraperitoneally a total of 6 doses of vaccine diluted 1 in 5, each animal receiving at 2-day intervals 0·25 ml. of that dilution. Intracerebral challenge of the vaccinated mice was made on the 14th day from the first dose of vaccine with serial tenfold dilutions of fixed virus derived from infected rabbit brain. The immunizing power of the vaccine was estimated, over a period of 8 months, at different times after its preparation and during its storage at different temperatures. To ensure complete sterility and innocuity the vaccine under test had, after primary inactivation, been kept for 15 days at + 4°C. Thereafter 3 samples were subjected to different temperatures: sample (a) was maintained at + 4°C.; sample (b) was kept at room temperature (20°–35°C.); and sample (c), after having been frozen at − 4°C. for 2 days, then thawed at + 26°C. for 2 days and then refrozen at − 4°C. for 24 hours, was stored at + 4°C. until used. The temperatures indicated are those liable to be encountered during the storage and transportation of a vaccine in a country where decentralization of anti-rabies treatment is practised. The immunizing power of the vaccine kept under the above conditions was determined by the HABEL potency test in mice, the 50% end-points of rabies mortality being estimated by the method of REED and MUENCH.

As a preliminary to the immunity tests the virus titre of the original brain substance used for preparation of the vaccine was estimated and found to be 4,787,000 LD50. Of this virulent material a 5% non-phenolized suspension proved after 15 days' storage at + 4°C. to have a titre of 478,000 LD50 and after storage for the same period at room temperature a titre of only 56 LD50. In comparison, the titre of a 5% suspension, when phenolized, fell to 148 LD50 immediately after 2 hours' inactivation at 37°C. and to 69 LD50 after 24 hours' subsequent storage at + 4°C.; after 15 days' storage at 4°C. virus was no longer demonstrable.

The immunity conferred on mice vaccinated with samples (a), (b) and (c) after various periods of storage was then investigated, with the following results: sample (a) after 20, 30, 60 and 100 days' storage at + 4°C. gave an LD50 of protection of 3,163, 2,755, 158 and 26·92, respectively; sample (b) after 30, 60 and 100 days at room temperature gave an LD50 of protection of 323, 15·49 and 12·89, respectively; and sample (c) after having been frozen and thawed and then stored for 30 days at + 4°C. conferred protection against only 4·78 LD50. A phenolized vaccine stored under the most favourable conditions of temperature (+ 4°C.) provided satisfactory protection, therefore, 60 days after its preparation—an LD50 of protection 10 times greater than that afforded by the same vaccine kept at room temperature for the same period. The very low immunogenic power possessed by sample (c) stresses the need for vaccine during transportation being maintained at the optimal temperature of + 4°C. throughout. During these experiments it was also observed that in mice immunized with vaccine stored at + 4°C. and subsequently challenged both the incubation period and the course of the disease were markedly prolonged—evidence of the vaccine's immunogenic potential.

Finally, the immunizing potency of a vaccine is shown also to depend on an initial high virus titre in the brain suspension from which it is produced. Thus,

whereas a vaccine prepared from a brain suspension with a titre of 4,787,000 LD50 before the addition of 1% phenol conferred protection against 2,755 LD50 after 30 days' storage at + 4°C., one prepared from a suspension with an initial titre of 148,000 LD50 conferred protection against only 446 LD50 after 35 days' storage at that temperature. *G. Stuart*

STIRBU, A. & STOIAN, I. Protection contre la rage conférée aux animaux par la vaccination antirabique de rappel. [**Rabies Protection as conferred in Animals by Booster Inoculations of Rabies Vaccine**] *Arch. Roumaines Path. Expér. et Microbiol.* 1959, Sept., v. 18, No. 3, 405–17, 2 graphs. [10 refs.]

The fact that the protection conferred by any single course of treatment with antirabies vaccine is of limited (3 months–2 years) duration has in recent years led to the use of booster injections of the vaccine, in order to stimulate the primary response to earlier treatment. To ascertain the immunity response of mice and sheep to such secondary stimulation with the vaccine employed in Rumania for the post-exposure treatment of man was the object of the present investigation.

This vaccine—a 5% suspension, in 1% phenolized physiological salt solution, of emulsified brain from sheep inoculated with the Babès strain of rabies fixed virus—had been inactivated for 2 hours at 37°C. and stored at + 4°C. before use; the finished product contained no living virus. The virus titre in the sheep's brain used for vaccine production was $10^{-6 \cdot 68}$ (4,787,000 LD50). Intracerebral challenge of the immunized mice and sheep was carried out with the Babès strain of fixed virus from rabbit brain. The vaccine, on Habel-type potency testing, conferred on mice an LD50 of protection of 3,163, 2,755, 158 and 26·92, respectively, 20, 30, 60 and 100 days after its date of preparation. Immunization and challenge were effected as follows:—

Mice. For primary (basic) immunization 180 white mice of 12–14 gm. weight were given intraperitoneally a total of 6 doses of vaccine diluted 1 in 5, each animal receiving at 2-day intervals 0·25 ml. of that dilution. Thereafter the mice were separated into 3 groups: group (i) was given no more vaccine (primary vaccination); groups (ii) and (iii) received, as from 8 days after the last primary injection, 2 further doses of vaccine at 2-day intervals (first booster vaccination); and group (iii) received, in addition, as from 8 days after the second of these doses, 2 further doses at 2-day intervals (second booster vaccination). Groups (i), (ii) and (iii) were challenged, respectively, 2 days after the last primary injection, 6 days after the first booster vaccination and 6 days after the second booster vaccination, with serial tenfold dilutions of fixed virus from rabbit brain giving original titres of 3,163,000, 14,800,000 and 10,000,000 LD50, respectively.

Sheep. For primary immunization 45 sheep were given daily, over a 20-day period (excluding Sundays), 2 doses of vaccine, each of 5 ml.—one dose being administered intraperitoneally, the other intramuscularly. Thereafter the animals were separated into 3 groups: group (i) was given no more vaccine (primary vaccination); groups (ii) and (iii) received, as from 14 days after the last primary injection, further doses of 10 ml. daily for 6 days (first booster vaccination); and group (iii) received, in addition, as from 14 days after the

first booster vaccination, further doses of 10 ml. daily for 6 days (second booster vaccination). For booster vaccinations the 10 ml. of vaccine given daily was administered as in primary immunization, *viz.*, 5 ml. intraperitoneally and 5 ml. intramuscularly. Groups (i), (ii) and (iii) were challenged, respectively, 14 days after the last primary injection, 14 days after the first booster vaccination and 14 days after the second booster vaccination, with 1 ml. of serial ten-fold dilutions of fixed virus from rabbit brain giving original titres of 15,140,000, 1,000,000, and 15,140,000 LD50, respectively.

Results of the experiments on mice showed the LD50 of protection to have increased from 3,163 in group (i), to 7,080 in group (ii) and to 13,490 in group (iii).

Results of the experiments in sheep showed, *inter alia*, that: in group (i), of 15 control animals subjected, in sub-groups of 5, to challenge with 10^{-3}, 10^{-4} and 10^{-5} dilutions of virus, only 1 survived, while of 15 immunized animals, in sub-groups of 5, similarly challenged, 11 (73·3%) resisted infection; in group (ii), all the immunized animals challenged with a dilution of virus containing 100 LD50 resisted infection, while all the control animals, similarly challenged, died of rabies; and in group (iii), 80% of the immunized animals challenged with a dilution of virus containing 15,140 LD50 resisted infection, while all the control animals, similarly challenged, died of rabies. In their evaluation of the results obtained in the sheep experiments the authors observe that, as compared with control sheep which resisted in a proportion of 6·60%, the percentage of resistance in vaccinated sheep after basic immunization and booster inoculations was of 73%. Further, it should be noted that of 24 sheep, which had survived challenge after receiving primary and booster inoculations and were again challenged 164 days after immunization, 9 resisted infection with 900,000 LD50.

From the results indicated above the authors consider that rabies vaccination by means of booster inoculations can confer "solid and persistent immunity".

G. Stuart

Selimov, M., Boltucij, L., Semenova, E., Kobrinskij, G. & Zmusco, L. Anwendung des Antirabies-Gamaglobulins bei Menschen, die von tollwütigen Wölfen oder anderen Tieren schwer gebissen wurden. [**The Use of Antirabies Gamma Globulin in Persons Severely Bitten by Rabid Wolves or Other Animals**] *J. Hyg., Epidemiol., Microbiol. & Immunol.* Prague. 1959, v. 3, No. 2, 168–80, 9 figs.

The authors describe the results obtained with antirabies gamma globulin during an outbreak of attacks by rabid wolves in Russia in 1957 and 1958. It was given in a daily dose of 0·25 cc. per kgm. body weight, continued up to 7 days according to the severity of the bite. Intensive vaccine treatment was given at the same time. The attacks and the extent of the injuries sustained are described in detail. No case of rabies developed among 22 persons with severe wounds of the face or head and 14 persons with multiple wounds of the limbs who were treated with both gamma globulin and vaccine, whereas 11 of 28 persons treated with vaccine alone developed rabies. 9 of 20 horses and cows bitten by a rabid wolf and given intensive treatment with Fermi vaccine developed rabies. The gamma globulin was generally well tolerated, but 2

persons developed serum sickness and 3 showed signs of shock. Treatment with gamma globulin and vaccine was also effective in 17 and with gamma globulin alone in 12 persons bitten by rabid or unknown animals

D. J. Bauer

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

KRAMCHANINOV, N. F. **The Contribution of Russian Doctors to the Study of the Epidemiology of Cholera in the First Third of the Nineteenth Century.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1959, v. 30, No. 1, 146–53. [Translated from Russian.]

ABOU-GAREEB, A. H. **The Epidemiology of Cholera in a West Bengal Village.** *J. Trop. Med. & Hyg.* 1959, Nov., v. 62, No. 11, 258–62, 1 map.

The epidemiological investigation here reported was carried out in a village in the Hooghly District, 15 miles from Calcutta. The area was typical of a cholera-endemic region in that it was hot and humid (temperatures ranging from 50–110°F., average humidity 80%), flat, with much surface water and carried a high population. In 1 square mile there lived 1,261 persons, 692 adults and 569 children. Their dwellings were primitive and were set among banana and bamboo groves, latrines were rare and the population defaecated on the ground amid the gardens. Though drinking water was obtained mainly from 7 tube wells, a number of ponds were used for washing, cleaning utensils and bathing [which would include rinsing the mouth]. Fly and mosquito breeding was rife and led to a high incidence of gastro-intestinal upsets among the population, of whom some 7·9% had been so affected during the previous year. Clinical cholera had not been seen for 2½ years previously.

Stool samples were collected from about half the members of 47 out of the 230 families in the village and were pooled by families before culture in 2% alkaline peptone water. By this means 3 strains of vibrio were isolated, only 1 of which however was agglutinable by cholera O polyvalent serum; it proved to be of the Inaba serotype. Investigation of all 7 members of the implicated family showed that the carrier was a male aged 45, who was wont to travel weekly to the local market town to sell his crops. 4 ponds in the immediate proximity of his house were investigated, from 2 of which Inaba type vibrios were recovered.

2 months later an intensive investigation of 10 families living in close proximity to the carrier was carried out. Out of 12 strains of vibrio isolated 1 proved to be a true cholera vibrio, of the Inaba strain. This carrier was a 60-year-old male. The carrier identified 2 months earlier now proved to be passing non-agglutinable vibrios only. A further investigation of the water from the neighbouring ponds now failed to isolate any true cholera vibrios, and

tank DW2, which had previously contained Inaba type vibrios, only held non-agglutinable vibrios.

A serological survey of the population was next carried out, samples being obtained from 101 villagers and 6 visitors, out of whom 11 only had received cholera vaccine. Only 54 persons were free from antibodies to Inaba and Ogawa cholera vibrios, the remaining 53 showing antibodies to one or the other or to both in a titre exceeding 1 in 20.

During the investigation pilgrims to a religious festival passed by the village and used a roadside tank [fortunately remote from the huts of the 2 carriers] for washing and drinking purposes. On the third day of the pilgrimage a non-agglutinable vibrio was isolated from this water. [The author suggests that free mutation between agglutinable and non-agglutinable vibrios of Heiberg's group I was occurring in the village, though it seems equally possible to the abstracter that 2 peripatetic adult males had become temporary contact carriers and had infected local collections of surface water for a short period. This paper well illustrates the precarious balance of epidemiological factors in a cholera-endemic area, and the high potential dangers which exist.]

J. H. Walters

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

DODIN, A. & GRELIER, L. L'amibiase à Madagascar. [**Amoebiasis in Madagascar**] *Arch. Inst. Pasteur de Madagascar*. 1959, v. 27, 47–52. [15 refs.]

Though amoebiasis is often diagnosed clinically in Madagascar, *Entamoeba histolytica* is not often identified. The authors investigated the infection and the parasite in Tananarive and while working with a mobile hygiene group on the east coast of the island.

In 1,697 stool examinations no quadrinucleate cysts were found, *E. coli* was present on 64 occasions and *E. histolytica* amoebae were identified 19 times. Only 3 of these last contained ingested red cells, 2 being from Europeans infected in Indo-China and the remaining one from a Malagasy who had not been outside the country. These 3 strains alone of the 19 isolated proved pathogenic in the guineapig. Some 5 to 10 cases of clinical amoebiasis are diagnosed annually at the Pasteur Institute. In only one case of liver abscess was *E. histolytica* found and in one case *Chilomastix mesnili* was recovered. Among 2,343 admissions for surgical complaints in Tananarive in 1958 2 patients with amoebic liver abscesses and one with an amoeboma were treated surgically and a patient with hepatitis recovered with drug treatment. Stool examinations at the Pasteur Institute since 1943 have revealed only a low incidence of cyst carriers and the rate has declined as diagnosis became more skilled. Examination of stools from schoolchildren on the east coast of Madagascar revealed incidences of 1·5% to 6·5%, usually of cyst carriers, the higher incidences being in the more densely populated districts.

All the investigations undertaken corroborated the view that though amoebiasis exists in Madagascar it is rare and feebly pathogenic. *T. H. Davey*

RISTIC, L. L'urticaire au cours de l'amibiase. [**Urticaria in Amoebiasis**] *Acta Med. Iugoslavica.* 1959, v. 13, No. 3, 363–9.

Two antigens are present in amoebiasis. The primary derives from the amoeba itself, the secondary from the products of its cytolytic enzyme. The incidence of amoebiasis in the general population of Serbia is about 25%. Among 393 patients there with active amoebiasis urticaria was noted in 9 cases (2·2%). Among 36 patients with chronic urticaria, but showing no signs of amoebiasis, the presence of the infection was established in 17 (47%).

Intradermal and complement-fixation tests [CFT], with antigens prepared from human liver abscess material, were done on 6 patients with active and 10 patients with latent amoebiasis. In all the active cases the intradermal test was positive. The CFT was positive in 5 of them; after specific treatment it became negative. The CFT was also positive in 3 of the latent cases. On analysis of his findings the author concludes that amoebiasis facilitates the development of allergic states, particularly involving the skin.

A. R. D. Adams

WALT, F. **Amoebic Liver Abscess in Infancy.** *J. Trop. Pediatrics.* London. 1959, Dec., v. 5, No. 3, 77–83, 1 fig. [23 refs.]

Amoebic liver abscess in infants and young children though not common has yet been widely recorded. The author from Durban, where amoebiasis is a serious problem in Africans, has searched the literature and gives a bibliography of the condition. He adds to it 16 further records of presumed amoebic liver abscess in African children, only 4 of whom were over 2 years of age. The diagnoses were made between 1948 and 1951 and 1954 and 1957; in 11 instances they were established either at autopsy (3 cases) or by the recovery of "anchovy sauce" material by aspiration; in the others on clinical grounds and by the aspiration of green or yellow pus, and the response to emetine treatment. Some illustrative case records are set out. In most cases there was a history of dysenteric diarrhoea, often of long duration; there was fever and usually a moderate leucocytosis; there was usually a swelling in one lobe of the liver (the left in 5).

The specific treatment now advocated is immediate emetine injections (5 mgm./lb. body weight divided into 10 daily injections); chloroquine diphosphate (7 mgm. of the base/lb. body weight daily for 15 days); diiodohydroxyquinoline (40 mgm./lb. body weight daily for 20 days); and tetracycline when there is active dysentery. Aspiration, repeated as necessary, is done to remove the abscess contents; from 2 or 3 to as many as 9 aspirations may be needed. When the diagnosis is clear, with a localized distinctive liver lesion, and treatment is prompt, the prognosis is excellent. *A. R. D. Adams*

ANDERSON, H. H. **Newer Drugs in Amebiasis.** *Clin. Pharmacol. & Therap.* St. Louis. 1960, Jan.–Feb., v. 1, No. 1, 78–86. [31 refs.]

POWELL, S. J., WILMOT, A. J. & ELSDON-DEW, R. **Potentiating Effect of Quinolines on the Action of Tetracycline in Amoebic Dysentery.** *Lancet.* 1960, Jan. 9, 76–7.

Antibiotics, especially the tetracyclines, are recognized as being of value in the treatment of intestinal amoebiasis; but they are expensive, and although producing clinical relief they are disappointing in producing radical (parasitic) cure.

African males in Natal, S. Africa, suffering from amoebic dysentery of moderate severity, were treated with one or other of 4 drug combinations. (1) 50 were given chloroquine sulphate (800 mgm. initially, 400 mgm. after 6 hours, and then 200 mgm. every 12 hours for 14 days), with diiodohydroxyquinoline (600 mgm. every 8 hours for 20 days), and tetracycline (50 mgm. every 8 hours for 10 days) concurrently. (2) 25 were given the same treatment less the chloroquine. (3) Another 25 were similarly given the tetracycline and chloroquine but no diiodohydroxyquinoline. (4) Yet another 25 had the diiodohydroxyquinoline and chloroquine but no tetracycline. Stools were examined daily; sigmoidoscopies were done on admission, and on days 5, 10, 20 and 27 after the start of treatment.

Treatment with all 3 drugs given concurrently (1) resulted in clinical relief (disappearance of symptoms, signs and parasites) of 94% of the patients; one month after the 27-day check, re-examination of the 32 patients of this group then available showed failure to eradicate the infection in only 12%. The "total failure" rates after treatment with the other combinations of drugs were considerably greater, (2) 52%, (3) 56% and (4) 84%, at this same time.

The results indicate that tetracycline, even in small dosage, when given together with both chloroquine and diiodohydroxyquinoline, gives a higher radical cure rate than does this antibiotic when given alone in its normal full dosage. *A. R. D. Adams*

SHAFEI, A. Z. **Puromycin, or its Combination with Phthalyl-Sulphathiazole for the Treatment of Intestinal Amoebiasis.** *J. Egyptian Med. Ass.* 1959, v. 42, Nos. 6/7, 424–9. [12 refs.]

Puromycin, it has been stated, is effective against *Entamoeba histolytica* both *in vitro* and *in vivo* [see this *Bulletin*, 1955, v. 52, 541; 1956, v. 53, 319 and 1118; 1958, v. 55, 406; 1959, v. 56, 833]. The author gave it to 24 patients with amoebiasis (8 with acute, the others with chronic relapsing, amoebic dysentery). Parasites were present in the stools of all but 2 of these patients; from these 2 cysts were recovered in mucus obtained sigmoidoscopically. Sigmoidoscopy was done twice weekly during treatment and for 2 weeks thereafter; weekly for another month; and finally twice monthly for a further 3 months—one-third of the patients absconded before these observations were completed. The dosage of puromycin used was 1·0 gm. (divided into 4) orally each day, in capsules, for 14 days; this was given to 12 patients; it had to be stopped in one of them who proved intolerant of the treatment; so 11 patients were fully treated with a course of puromycin alone. The other 12 patients were given this same course together with 3·0 gm. of phthalyl sulphathiazole by mouth each day. There was clinical betterment in all cases, with arrest of symptoms; but the combined treatment induced a more prompt clinical

response, and more rapid clearance of rectal lesions and disappearance of parasites.

After treatment with puromycin alone 4 patients of the 11 (36·3%) relapsed; after the combined treatment 2 of 12 (16·6%) relapsed. The effect of puromycin recalled that of fumagillin treatment—slow clinical improvement and poor healing of ulcerative lesions—and was inferior to that obtained by treatment with the tetracyclines or erythromycin. Phthalyl sulphathiazole apparently acts synergically with puromycin and enhances its effect. Hepatic amoebiasis was not found to benefit from puromycin treatment. No serious toxic effects were noted. *A. R. D. Adams*

NAGATY, H. F., RIFAAT, M. A. & KHALIL, H. M. **Treatment of Amoebic Dysentery by (Entobex + Enterovioform).** Reprinted from *Bull. Clin. & Sci. Soc., Abbassiah Facul. Med.* 1958, Oct., v. 9, No. 2, 77–82.

Readers of this *Bulletin* will be familiar with the many studies already made on the use of Ciba 11925C (Entobex) in the treatment of amoebic dysentery, including a trial by the present authors, from Cairo [this *Bulletin*, 1959, v. 56, 163].

They list and classify the various agents used in the treatment of amoebiasis and then describe a new study. The clinical features and results of treatment in 14 patients aged 9 to 54 years are tabulated.

They used a new combination introduced by the manufacturers of Entobex which consists of tablets each containing 20 mgm. Entobex + 200 mgm. Enterovioform (Vioform). The preparation was given orally in doses of 3 to 9 tablets daily for 5 to 10 days, to a total dosage of 30–60 tablets.

All the patients showed evidence of acute dysentery and most of them had histories of dysentery for 2 years or more. 9 had *Entamoeba histolytica* trophozoites in the stools, 1 also had precystic forms and 5 had cysts. Patients were followed up for 1 month, during which time stools were examined daily for the first week and then every other day.

Parasitological and clinical improvement was evident in all in 3 to 4 days and stools were normal at the end of treatment. No patient showed amoebae in the stools after the fourth day of follow-up until the end of the month, but one relapsed after 1 month and another after 2 months (these may have been re-infections). One of these was cleared by a second course of treatment and the other was treated with emetine.

No toxic symptoms were observed with the doses used, which are calculated on the basis of mgm./kgm. per day to have contained one-third the quantity of Entobex used when that preparation was given alone: nevertheless the results were as favourable with the new combination as with Entobex given by itself. *H. J. O'D. Burke-Gaffney*

WILLIAMS, G. A. H. **Experimental Hepatic Amoebiasis and its Application to Chemotherapeutic Studies.** *Brit. J. Pharmacol. & Chemotherapy.* 1959, Dec., v. 14, No. 4, 488–92. [15 refs.]

Experimental infections of hamster livers by *Entamoeba histolytica* have recently been used for screening anti-amoebic drugs [this *Bulletin*, 1951, v. 48,

1113; 1952, v. 49, 511]. The present author has used rats, guineapigs and hamsters in which to establish liver infections with 2 strains of the parasite. Hamsters were more susceptible.

Approximately 8,000 amoebic trophozoites were injected intrahepatically in 0·02 ml. volume. Effects due to injected bacteria were minimized by treatment of the host with antibiotics; bacteriologically sterile amoebic abscesses were not however obtained. The drugs were given in 3 doses before infection, followed by 5 doses thereafter over a total period of 4 days. The mean survival time of the host was used for evaluation of drugs.

A table indicates the incidence of lesions in the 3 species of animal and the percentage in which amoebae were found. Amoebae occurred only in a particular kind of abscess and were generally found at the junction of dead and healthy liver tissue. Serial passage of amoebae from liver to liver increased virulence, but with more frequent passages in liver the amoebae became more difficult to culture. The rat caecum was also more readily invaded by these organisms. In guineapigs amoebic abscesses were not found after intrahepatic or portal- or mesenteric-vein inoculation.

The results of treatment with emetine, chloroquine, fumagillin and some anilides are given in tabular form and indicate that formation of abscesses was not prevented by drug treatment. The anilides tried were less effective than the standard reagents, chloroquine or emetine.

The author considers that the hamster is a suitable host for testing hepatic amoebicides. *J. D. Fulton*

GROTT, J. W., BORKO, W. & PEDRYCZ, W. O skuteczności zwalczania lambliozy u dzieci skojarzonym leczeniem atebryną oraz Entobexem, związkiem fenantrolinchinonowym. [**On the Efficiency of Combating Lambliasis in Children by a Combined Treatment with Atebrin and Entobex, a Phenanthroline-Quinine Compound.** *Wiadomości Parazytologiczne*. Warsaw. 1959, v. 5, No. 6, 509–17. [18 refs.] English summary.

24 children aged 6–13 years having *Giardia* infections were given mepacrine treatment for 2 days. Thereafter they were given 3 courses of Entobex each lasting 7 days, with a week's interval between each. The dose of Entobex was 100 to 300 mgm. daily, according to age; this was well tolerated.

22 were free from *Giardia* cysts after 45 days from the beginning of treatment and 10 of these were still negative after 99 to 126 days: one child examined on the 72nd day was also negative. The combined treatment seemed to have prevented the relapses sometimes seen when mepacrine alone is used.

H. J. O'D. Burke-Gaffney

RELAPSING FEVER AND OTHER SPIROCHAETOSES

REISS-GUTFREUND, Ruth J. Culture de *Borrelia recurrentis* (souches éthiopiennes) en oeuf fécondé de poule. [**Culture of *Borrelia recurrentis* (Ethiopian Strains) in Fertilized Eggs**] *Ann. Inst. Pasteur.* 1960, Jan., v. 98, No. 1, 131–6. [11 refs.]

The author has isolated 5 strains of *Spirochaeta recurrentis* in fertilized fowl eggs by the direct inoculation of either infected blood or from lice which had fed on relapsing fever patients. The eggs were usually incubated for 12 or 13 days before being infected by depositing the infective material on the chorio-allantoic membrane. The interval between inoculation and appearance of spirochaetes in the egg was found to diminish according to the length of time the egg had been incubated: 7 days in the case of those incubated 7 days, only 48 hours in eggs incubated 19 days. Unlike the North African strains the Ethiopian strains were easily maintained by passage in eggs and after at least 35 passages still retained their virulence when tested in newly born rabbits and also when tested by infection of lice. The spirochaete was found to be pathogenic to the developing fowl embryos and in the case of eggs inoculated on the 14th day the chicks which hatched contained numerous parasites: thereafter they contained parasites in variable numbers.

This method of culture would seem to offer a practical technique for the isolation and maintenance of Ethiopian strains of *S. recurrentis.*

Edward Hindle

EIDMANN, E., LIPPELT, H. & POESPODIHARDJO, S. Quantitative Untersuchungen über die Vermehrung von *Borrelia erratici* in der weissen Maus. [**Quantitative Studies on the Multiplication of *Borrelia erratici* in White Mice**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Nov., v. 10, No. 3, 339–50, 4 figs. [30 refs.]

The authors have studied the multiplication of spirochaetes in white mice experimentally infected with *Borrelia* [*Spirochaeta*] *erratici.* The interval between the inoculation and the appearance of spirochaetes in the blood circulation was found to depend both on the dose and the method of infection—subcutaneous or intraperitoneal. Thus after an injection of 100,000 spirochaetes the organisms were observed after an average interval of 3 days, but when only 100 were injected the negative interval was 6–7 days. The subcutaneous injection of 10 spirochaetes did not produce any infection, but the same number injected intraperitoneally produced infection after a negative interval of 8–9 days.

When the blood was examined by the thick drop method, spirochaetes could be detected earlier than by using dark field examination, in some cases only one hour after the inoculation of 100,000 organisms. This is considered to be an argument against the existence of any negative phase of the organism.

The infection showed a log phase type of multiplication with an average period of about 6 hours for each generation. Experimental data yielded by 14 individual mouse tests are given in detail and it is shown that the multiplication phase is followed by a stationary phase of maximal concentration.

Edward Hindle

YAWS AND OTHER TREPONEMATOSES

MEDINA, R. Modalidades evolutivas de la serología en enfermos de buba. [**Evolutive Serological Responses in Yaws Patients**] *Archivos Venezolanos de Patol. Trop. y Parasit. Med.* 1959, July, v. 3, No. 1, 290–97. [13 refs.] English summary.

This is a report on serological observations on 190 untreated yaws patients followed up for 8–15 years; 26 were under 15 years of age. They came from states near Caracas and were in different stages of the disease including the latent early and latent late stages. Care was taken to exclude infection with other treponematoses. Qualitative and quantitative Kahn tests and the Wassermann test were used. At least two serological tests each year were made on each patient, but on some these were more frequent.

Of 71 patients observed for 8–10 years, 21% remained strongly positive, 48% remained positive but fluctuated between strong and weak reactions, and 22% were always weak. Of the 119 observed for 11–15 years or more the reactions fluctuated between negative and positive; the transition was gradual but the reactions were more often positive than negative. Sero-negativity lasted as a rule for 2–3 years and rarely longer than 4–6 years. Among patients examined monthly (5%) non-reactive periods did not usually exceed 2–3 months. The author stresses that during the period he observed his patients permanent sero-reversal did not occur. Intercurrent infections did not influence the serological response.

The Wassermann usually agreed with the Kahn but reversal followed that of the Kahn.

An unspecified number of patients were followed up after what was regarded as adequate treatment, *i.e.* 30–40 doses of bismuth (Bivatol) in courses of 10 weekly doses separated by 2–3 week intervals, or PAM 1·2–10 mega units, or combinations of them.

If the infection had been present for less than one year before treatment sero-reversal occurred 3–8 months after treatment. 90% of patients with infections of over 18 months, with or without active lesions, remained sero-positive for the next 3 years. All patients with late lesions or in the latent late stage and observed for 10 years after treatment, showed serological reactions similar to those in untreated patients, namely, some were constantly strongly positive and some constantly weakly positive while others either fluctuated between weak and strong or between strongly positive and negative reactions; this last appeared to be the usual pattern.

[The paper is only a summary of the findings which could usefully have been reported more fully. The failure to observe permanent sero-reversal during observation of at least 8 years is very interesting. More studies of this kind are urgently needed.] *C. J. Hackett*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

MERLE, F. Considerations sur la lépre au Cameroun. **[Considerations regarding Leprosy in the Cameroons]** *Méd. Trop.* Marseilles. 1959, Nov.–Dec., v. 19, No. 6, 659–69, 1 map & 1 chart.

Advantage was taken of a four-yearly plan to vaccinate the inhabitants against smallpox and yellow fever to make a census of leprosy in the population. This was done in 1959 when 2,700,000 out of the 3,200,000 inhabitants were examined. This examination showed 34,226 cases up to the end of July 1959, as compared with 19,351 in 1956, 25,284 in 1957 and 29,578 in 1958. In these same years the numbers of new patients rose from 2,108 in 1956 to 8,372 in 1958 and 7,188 in the first half of 1959. Over the whole area the leprosy rate varied from 0 to 4%.

Treatment consists of injections of *sulfone retard* given at village leprosaria or at scattered dispensaries and by itinerant medical staff. There are 28 public and 8 private institutions for leprosy patients holding in all some 3,892. But residential treatment centres are more and more being replaced by the new method of treatment by itinerant assistants who now treat some 20,000 newly found patients. The scheme is described in detail. There are villages for leprosy patients in suitable locations where they can be visited by itinerant doctors and medical auxiliaries. These villages could be made to serve as models of sanitary method to other healthy villages in the neighbourhood. There are a few hospital beds where patients needing special temporary attention may be looked after.

In the days of chaulmoogra treatment the chief emphasis was laid on segregation to prevent the spread of infection: now that sulphones quickly render patients much less infectious the emphasis is rather on early and regular treatment.

The paper ends with emphasis on the danger of infection of young children, and with the recommendation that all infants in contact with leprosy should be vaccinated with BCG. *Ernest Muir*

MALLAC, M. J. **Aspects of Leprosy Control in the Gambia, B.W.A. (a 2-Year Assessment).** *Leprosy Review.* 1960, Jan., v. 31, No. 1, 12–18, 1 map.

Gambia, an enclave in Senegal, is about 300 miles long, extending to a breadth of about 10 miles, and lying on either side of the river. The present scheme for leprosy control is sponsored by UNICEF. Two previous partial surveys estimated that there were between 6 and 8 thousand patients with leprosy, in a population of 266,476.

In the present survey 608 villages have been examined, and 4,025 cases of leprosy found. The incidence of leprosy varies considerably in different races of the population, being highest (33 per 1,000) among the Serahulis. It is calculated that there are 18 per 1,000 among females and 15 per 1,000 among males, which is the opposite of the usual finding that leprosy is more common

among males: this is explained by the harder working day of the women. Only 220 lepromatous cases were found, but it is recognized that facilities for bacteriological examination might increase that number considerably. There is a disproportionately large number of deformed and disabled patients, and it is considered that mass treatment with sulphones is not enough to control leprosy unless at the same time facilities are made available for reconstructive surgery and physiotherapy. Patients become discouraged and leave off treatment when they find that their deformities are not benefited by treatment. "It is therefore manifestly clear that the Gambia needs a focal leprosarium whereby the estimated 20–30% of mutilation of the extremities and the estimated 15–20% of perforating ulcers of the feet could be properly attended to as well as all the reactive cases." *Ernest Muir*

McFadzean, J. A. & Valentine, R. C. **The Examination and the Determination of the Viability of *Mycobacterium leprae* by Electronmicroscopy.** *Leprosy Review*. 1960, Jan., v. 31, No. 1, 6–11, 4 figs. on 2 pls.

The authors refer to their previous work on the examination of *Myco. lepraemurium* by electronmicroscopy [this *Bulletin*, 1960, v. 57, 141] and compare their findings in the similar examination of *Myco. leprae*. In both organisms they found two forms: a normal and a degenerate form. The normal forms in each organism show the protoplasm filling the whole cell wall, whereas in the degenerate forms of both the protoplasm has shrunk away from the cell wall and appears to be shrivelled. The method of preparing material for examination by grinding and centrifuging is described.

The average percentage of degenerate forms of the rat leprosy organism was only 5, compared with 56 in the samples taken from untreated human leprosy, with a range of 20 to 96. It was questioned whether the method used for preparation of material influenced the proportion of normal and degenerate bacilli found, whether the part of the patient's body from which specimens were taken made any difference, and whether the results with the electronmicroscope corresponded with the appearances of the bacilli when the ordinary staining methods of examination were used. In none of these was a significant difference detected when experimental comparisons were made.

The authors consider that the degenerate appearance of the mycobacteria is an indication that they are dead, and that therefore in the methods employed we have a means of testing the viability of mycobacteria. They were puzzled by the fact that after about 12 months of DDS treatment they should have failed to find any more degenerate bacilli although they were still present in ordinary smears. They suggest that treatment may have made the bacilli friable, and that they are then broken up by the extraction processes.

Ernest Muir

Dungal, N. **Is Leprosy transmitted by Insects?** *Leprosy Review*. 1960, Jan., v. 31, No. 1, 25–34.

We do not yet know for certain how leprosy is transmitted. The fact is that it has always been known to spread where squalor and vermin abound, and to

stop spreading when cleanliness of body and housing are adopted. The spread of leprosy does not suggest a flying vector. *Acarus* [*Sarcoptes*] *scabiei* is suggested as a possibility: "it might be able to transmit the disease by its burrowing into the skin, where *M. leprae* would be deposited with the excrements and might be able to grow from out of the burrows. Even though the burrows are mainly in the epidermis, the parasite reaches the Malpighian layer and a part of the burrow will therefore penetrate the corium, where *M. leprae* may be implanted by this means".

In an appendix the results are given of a questionnaire addressed to countries all over the world where leprosy is common, and asking particulars as to the occurrence of 11 different parasitic insects, and also asking about the customs of the people regarding clothes. To find out if leprosy is transmitted by fleas, lice or *Acarus scabiei*, it is suggested that an experiment be planned in an "isolated community, preferably an island where leprosy is heavily prevalent".

Ernest Muir

MONTESTRUC, E. La "C-reactive protein" dans l'infection lépreuse. [**C-reactive Protein in Leprosy Infection**] *Bull. Soc. Path. Exot.* 1959, Sept.–Oct., v. 52, No. 5, 561–4.

C-reactive protein (CRP) is a globulin (probably a beta globulin) which is formed in the blood whenever the subject suffers from inflammation or any acute infection. It is precipitated by the polysaccharide C of the pneumococcus, and hence its name. The usual way to test for its presence is by the antibody-antigen reaction between the serum of rabbits immunized with CRP and human serum which may contain the CRP antigen. These 2 sera are mixed in capillary tubes and the reaction is read after 2 hours at 37° followed by 8 hours at 3°C. The strength of the reaction is calculated from zero up to 4-plus.

The author found the reaction positive in almost all lepromatous or tuberculoid patients when there was lepra reaction present. The strength of the CRP reaction diminished under hormone treatment, and the disappearance of the reaction was prognostically favourable. It is considered reasonable to carry on hormone treatment till this disappearance occurs, and when the CRP reaction is positive in a non-reacting patient to restrict sulphone treatment lest it bring on reaction. The best way to judge of a patient's position with regard to lepra reaction is to use a combination of the CRP reaction and the erythrocyte sedimentation test, since there is some correlation between the two.

Ernest Muir

BECHELLI, L. M. **The Influence of Repeated Lepromin Testing on the Mitsuda Reaction in Healthy People.** *Internat. J. Leprosy.* Wash. 1959, July–Sept., v. 27, No. 3, 228–35. [16 refs.]

The author and his colleagues found that when a second lepromin test was done 11 months after the first in healthy children, negative results had turned to positive in 70 to 80%, and there was intensification of reaction in 48% of those who had been only 1 plus positive [this *Bulletin*, 1953, v. 50, 1055]. They therefore devised an experiment on 4 groups of children using, respectively, fresh BCG, old BCG, and killed BCG as antigens; the fourth being

a control group. On second lepromin testing the percentage increases from negatives or doubtfuls in these groups were respectively 86·5, 77·8, 69·0, and 80·0. Similar test groups in whom the original reaction was 1-plus showed percentage increases in the second tests of 58·1, 52·9, 41·2, and 49·2 respectively.

Another experiment was planned to see if there was any difference between Dutch children who had recently immigrated and Brazilian children who had been born and brought up in Brazil. 28 negative and doubtful reactors and 31 controls (both groups Dutch) were chosen; after BCG vaccination of the 28 children there was an increase in lepromin reactivity of 78·6%, but in the control group the increase was only 41·9%. The increases in the 1-plus group were 25% after BCG and 18·2% in the control group. In corresponding groups of Brazilian children the negatives and doubtfuls showed an 88·9% increase with BCG, and an increase of 59·1% in the controls. The lepromin 1-plus positives showed an increase of only 5·0% after BCG, and of 12·1% in the controls.

The author believes that lepromin acts as a "sensitizer, in an organism that will answer in a positive or a negative way according to its capacity for defense". This sensitization may take a longer or a shorter time, and in some it will not occur at all. He does not know whether lepromin by itself can increase resistance, and further research is necessary. *Ernest Muir*

Alonso, A. M. & Azulay, R. D. **Observations upon the Borderline Form of Leprosy.** *Internat. J. Leprosy.* Wash. 1959, July–Sept., v. 27, No. 3, 193–201, 8 figs.

The authors remark on the rarity of borderline (dimorphous) cases of leprosy. However, they have found 10 cases in Rio de Janeiro among 240 dispensary patients.

Histologically the lesions resemble the tuberculoid granuloma with the subepithelial band of infiltration, but the tuberculoid structure is not well defined and is generally without giant cells. There may be foamy cells in the same lesion, while in others the tuberculoid and lepromatous histology are far apart. Clinically there is a succulent soft infiltration, and the lesions are often annular, with flat centres without signs of involvement. Bacilli are usually found, and sometimes even globi. Some patients are positive in the skin and negative in the nose, while others are the reverse. The lepromin reaction was positive in 8 out of 35 cases of the borderline form described by De Souza Lima and Maurano (*Reação Leprótica*, 1949, Rio de Janeiro: Gráfica Milone). A table is given detailing the various features in the 10 patients.

In the authors' experience the prognosis is good, compared with that of lepromatous type; some patients become bacteriologically negative within 3 months of treatment. *Ernest Muir*

Job, C. K. & Gault, G. W. **Bullous Type of Reaction in Leprosy.** *Leprosy Review.* 1960, Jan., v. 31, No. 1, 41–5, 8 figs. on 4 pls.

The authors discuss the condition commonly known as lazarine leprosy with reference to the literature on the subject. They consider that it should not be

classified as a separate type of leprosy, but rather as a phase occurring either in lepromatous or in tuberculoid leprosy, and suggest applying the term " bullous reaction " in leprosy. It is characterized by deep ulceration extending to the muscles and tendons and resulting in scars and deformities. In the case described here there was narrowing of the lumina of the vessels, and even thrombosis. The general picture was that of lepromatous leprosy.

It is suggested that this condition is not confined (as was once supposed) to Mexico and South America, but may be not uncommon in India and the Orient.

The article is illustrated with a number of striking photographs of the skin lesions and of the histological appearances. *Ernest Muir*

ROLLIER, R. & REBOUL, E. La gynecomastie lépreuse. Étude préliminaire. **[Preliminary Study of Gynaecomastia]** *Internat. J. Leprosy*. Wash. 1959, July–Sept., v. 27, No. 3, 221–7.

Out of 700 leprosy patients the authors found 108 (15%) suffering from gynaecomastia. This paper reports the results so far of their investigation of the cause of this condition. 84 of the 108 patients with gynaecomastia were lepromatous, 12 tuberculoid and 12 indeterminate.

Various possible causes are discussed, such as nutrition, the function of the liver, and the effects of treatment. These possibilities however are ruled out in favour of functional change in the testicles resulting in hypogonadism. The authors admit however that other endocrines may be involved, or even that there may be a nervous influence.

Special examinations of the last 7 patients seen are described. In all of them there was more or less leprotic involvement of the testicles, resulting in sclerosis and destruction of the cellular elements. All these 7 specially examined patients were lepromatous. [No mention is made of testicular involvement in the 12 tuberculoid patients, in which type it is generally considered that the testicles are not affected.] In 4 of the 7 patients specially examined it was found that the 17-ketosteroids excreted in the urine were definitely below the normal amount. *Ernest Muir*

BROWNE, S. G. **Onchocerciasis and Leprosy.** *Leprosy Review*. 1960, Jan., v. 31, No. 1, 46–51. [10 refs.] [English version of article from *Ann. Soc. Belge de Méd. Trop.* 1959, June 30, v. 39, No. 3, 257–65.]

See this *Bulletin*, 1960, v. 57, 40.

DAVISON, A. R. **The Triple Treatment of Tuberculoid Leprosy.** [Addendum to *Leprosy Review*, 1959, July, v. 30, No. 3, 184–5.] *Ibid.*, 1960, Jan., v. 31, No. 1, 40.

Since the original article was published [this *Bulletin*, 1959, v. 56, 1145] alterations in the posology there mentioned have been made. 50 mgm. of DDS is now given 3 times a week for the first month, then 50 mgm. daily for 6 days a week in the second, then 100 mgm. daily for 6 days a week in the

third month. Treatment is stopped for 1 month every year. Trivalent antimony, chiefly in the form of Stibaphen, is given, up to 3 cc. on alternate days for one month with a rest on alternate months. 200 mgm. of mepacrine is given daily for 3 weeks in each month followed by 1 week's rest.

Clinical details of 2 cases are attached. *Ernest Muir*

Languillon, J. & Clary, J. Traitement synergétique de la maladie de Hansen par des injections bimensuelles de sulfone-mère-thioacétazone en milieu chaulmoogrique. [**Synergic Treatment of Hansen's Disease with Twice-Monthly Injections of DDS and Thiacetazone**] *Bull. Soc. Path. Exot.* 1959, May–June, v. 52, No. 3, 251–5, 3 figs. on 3 pls.

This combination of 0·6 gm. of each of these drugs, suspended in 6 cc. of an equal mixture of chaulmoogra oil and esters, with guaiacol added to 4%, was used in the treatment twice a month of 57 formerly untreated patients (17 lepromatous, 33 tuberculoid, 7 indeterminate) for periods of 12 to 17 months. In 9 cases the lesions entirely disappeared. In 43 there was very marked improvement. In all of the lepromatous cases the bacilli were very much diminished. Lepra reaction was less frequent than with DDS alone, and less severe, and tolerance was always good. This treatment with thiacetazone is considered too expensive for mass use, but the combination should be used when DDS is not tolerated well, when reactions are severe, or when improvement on DDS has become stationary. *Ernest Muir*

Ekambaram, V. & Sharma, C. S. G. **Treatment of Plantar Trophic Ulcers with "Novolep" in a Rural Leprosy Centre.** *Leprosy Review.* 1960, Jan., v. 31, No. 1, 35–9, 12 figs. on 4 pls.

Novolep is said to be a by-product of the manufacture of DDS, and to contain a small amount of DDS and a large percentage of alcohol.

To test its effect in the treatment of trophic ulcers 2 groups of patients were chosen. The first group contained 4 lepromatous and 7 non-lepromatous in-patients. Dead bone had first to be removed, and ulcers were cleaned up with magnesium-sulphate-glycerin dressings. Then daily dressings of gauze soaked in Novolep were applied. The second group consisted of 11 out-patients (4 lepromatous and 7 non-lepromatous).

The results were much better with the in-patients than with the out-patients. In the first group all healed (except 1 in whom there was involvement of bone), 6 of them completely, after treatment for 2½ to 10 months and the remainder partially. In the second (out-patient) group only 3 healed completely and 5 partially. It is considered at least that healing under Novolep is definitely quicker than with other applications. *Ernest Muir*

Fritschi, E. P. **The Use of Hydergine in the Treatment of Trophic Ulcers in Leprosy.** *Internat. J. Leprosy.* Wash. 1959, July–Sept., v. 27, No. 3, 216–20.

Because of the widely held opinion that diminution of blood supply is a fundamental cause of persistent ulceration, and the report of the effect of

Hydergine by intra-arterial injections [see GOKHALE, this *Bulletin*, 1958, v. 55, 774], the author planned a controlled experiment with patients suffering from various forms of trophic ulcers of the feet (14 feet studied), with other comparable patients who were given placebos (12 feet studied). The drug used was Hydergine in the form of sublingual tablets each containing equal parts of dihydroergocornine, dihydroergocristine, and dihydroergocryptine, with a total of 0·25 mgm. of the alkaloids. The tablets were given thrice a day. Blood pressures were taken daily. Two groups of patients were included, the one for 8 weeks and the other for 6 weeks. The results showed that the progress was similar in the trial patients and in the controls. *Ernest Muir*

DOULL, J. A. **The Need for Study of the Potentials of Surgery and Physiotherapy in Leprosy, with Estimates of Frequency of Disability based on Findings.** *Internat. J. Leprosy*. Wash. 1959, July–Sept., v. 27, No. 3, 202–15. [19 refs.]

First the literature on nerve involvement in leprosy, and the consequent secondary lesions of the extremities, etc., are described. In the author's own experience in the Ryukyu Islands, 1 per 1,000 of 10,550 persons were found to have leprosy. There were 1,250 patients in the 2 leprosaria. Examination showed that 11% of these had no disability, but some disability was present in 89% of all patients.

From these and other figures it is calculated that 32% of all the leprosy patients in these islands had moderate or severe disablement. The estimated percentages of disabilities among lepromatous patients were: hand contractures 29·4, amputations affecting hands 15·4, amputations affecting feet 13·0, trophic ulcers 20·7. In tuberculoid patients the corresponding figures were respectively 41·5, 22·0, 25·9, and 38·1.

5% of lepromatous patients were calculated to have lagophthalmos, and 11% of the tuberculoid patients.

The author quotes largely from the work of Paul BRAND [this *Bulletin*, 1956, v. 53, 604] as to what can be done by physiotherapy and orthopaedic and plastic surgery to prevent and remedy these disabilities.

To show the size of the problem the author calculates that out of several million sufferers from leprosy disability is present in more than half, occurring earlier in the tuberculoid type and later in the lepromatous. Under 10 headings he summarizes recommendations of what should be done to meet the situation.

Ernest Muir

BROWN, J. A. K. **Mass Campaigns and the Individual.** *Leprosy Review*. 1960, Jan., v. 31, No. 1, 19–24.

The mass campaign in the control of any disease is as a rule an expedient where facilities for more individual treatment are not available. Since the advent of sulphones it has become possible to apply mass treatment to leprosy. Good results have been obtained, but the author warns against complacency. Treatment must be continued for 3 or more years. "For one reason or another he [the patient] may decide to cease treatment before he is cured and

by this irregularity produce a drug resistant strain of bacillus. This may take years to develop in such a chronic disease, or years to discover, but there is evidence to suggest that it happens." It is therefore necessary that patients should feel better, look better, and be accepted by society as being better. The mass campaign in leprosy therefore must have a wide attack; its limitation is that the treatment of the individual becomes superficial and erratic. It should use every opportunity of discovering in what way those who contract leprosy differ from those who do not and how those differences may be resolved.

Ernest Muir

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (*schistosomes, other flukes*); CESTODES (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); NEMATODES (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

LO NIGRO, T., BRUCOLI, E. & VENEZIA, F. Prima indagine sulla elmintiasi nella popolazione scolastica di Matera. [**A First Survey of Helminthiasis in the School Population of Matera**] *Riv. Italiana d'Igiene*. 1959, July–Aug., v. 19, Nos. 7/8, 281–90. [12 refs.] English summary (8 lines).

[Matera is the chief town and district of Lucania, one of the wildest and least known regions of Italy: it is situated in the "instep of the boot" and the life of the inhabitants is described in Carlo LEVI's *Christ Stopped at Eboli*.]

The stool specimens examined were obtained from the natural evacuations of 207 schoolchildren, aged 5–14 years, in Piccianello, an outlying part of the district. Soil infestation is common and considerable there. The children came from all classes of family. Direct microscopic examination and also enrichment methods were employed, but no such special techniques as anal swabbing or Scotch tape.

99 subjects gave a positive result—a rate of 47·8%. Tabulated for each child are the age, father's occupation, kind of parasite or parasites and degree of infection (+ to + + +). 30·91% had *Trichuris*, 10·63% *Enterobius*, 10·14% *Hymenolepis*, 9·18% *Ascaris*, 8·21% *Ancylostoma* and 0·48% *Strongyloides*. A multiple infection was found in 19·32% of the children.

[Because helminth eggs may be discharged only intermittently and for other reasons, there is no doubt that higher rates would have been obtained if repeated examinations had been carried out on the same children and if more special techniques had been employed.] *J. Cauchi*

BROWN, H. W. **The Actions and Uses of Anthelmintics.** *Clin. Pharmacol. & Therap.* St. Louis. 1960, Jan.–Feb., v. 1, No. 1, 87–103. [54 refs.]

ZAHER, M. F., BADR, M. M. & FAWZY, R. M. **Bilharzial Urinary Fistula with Report on 50 Cases.** *J. Egyptian Med. Ass.* 1959, v. 42, Nos. 6/7, 412–19.

The authors note that urinary schistosomiasis now leads less frequently than formerly to urethral fistula and put this down to mass antischistosomal treatment in the Egyptian villages. Since fistula is a late complication the renal function is already impaired and the general health often undermined, so that these sufferers are poor operative risks.

They consider that the fistula commonly begins as a schistosomal ulcer which is then secondarily infected and erodes towards the skin on the perineum. They find that urethral stricture is not common (only 8% in this series) and this is at variance with findings in other regions where the disease is common. The ages ranged from 15 to 55 with most patients in their third decade. All were male. There was only one opening in 90% of the cases and this was much more common on the left of the mid-line between the base of scrotum and anus. Curettings of the tracks did not usually reveal live ova.

The treatment should begin w.th full urological investigation and then general supportive treatment. Specific measures required may be listed as follows:—

(1) antischistosomal and antibiotic therapy (tartar emetic was used),
(2) one stage excision of the fistula,
(3) simple diversion of urine,
(4) excision of the fistula with diversion of urine done in 1 or 2 stages.

In this series the first line of treatment was successful in 1 case, and the second line likewise successful twice. In these a catheter was left in for 4 days and the perineal wound drained for 3 days. Urethral dilatation was started on the fifth day and continued twice weekly for several weeks. The remainder of the patients required the fourth method of operation. The diversion of urine was either suprapubic or perineal and continued usually about 12 days or until the perineal granulations were flush. Gantrisin [sulphafurazole] was given as a urinary antiseptic.

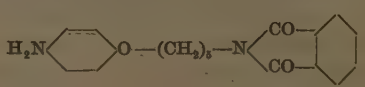
Operative details of the excision of the tracks are detailed with some warnings as to hazards, and the best ways of dealing with urethral strictures (but only 4 were encountered), widely separated fistulae, profuse haemorrhage and widely gaping wounds which may look so formidable with the patient in an exaggerated lithotomy position but which come together comfortably when the operation is over.

There were only 2 recurrences in the whole series—an excellent result.

J. R. Rose

COLLINS, R. F., DAVIS, M., EDGE, N. D., HILL, J., READING, H. W. & TURNBULL, Eleanor R. **The Schistosomicidal and Toxic Effects of Some *N*-*p*-Aminophenoxyalkylamides.** *Brit. J. Pharmacol. & Chemotherapy.* 1959, Dec., v. 14, No. 4, 467–76. [13 refs.]

A new compound for the treatment of schistosomiasis is described, *viz.* *N*-(5-*p*-aminophenoxypentyl)phthalimide, (M & B 2948A)—



and also the corresponding benzamide (M & B 3002). These are the most active and least toxic of a long series of compounds similar to those which had previously been reported by COLLINS *et al.* [this *Bulletin*, 1959, v. 56, 68]. In mice these compounds showed activity equal to that of lucanthone (CD50 0·15–0·20 gm./kgm./day) but their chronic toxicity was lower (LD50 1·20 gm./kgm./day for 2948A, 0·88 for 3002, and 0·18 for lucanthone). The compounds were inactive in the treatment of monkeys given 0·4 gm./kgm. daily for 4 days, but they were effective in curing hamsters in these doses.

As regards toxicity 2948A was not lethal to mice or rabbits in a single oral dose of 4 gm. per kgm.; 3002 was not lethal to mice or rabbits at 4 gm. per kgm. but for rats the LD50 was 3 gm. per kgm. In monkeys 2948A caused no symptoms in daily oral doses 0·5 and 1·0 gm. per kgm. but 3002 in these doses caused ataxia without any ocular lesions. The compounds caused some toxic changes in the retina of cats when given 20 daily doses of 0·4 gm. per kgm. but not if lower doses were given. Much other information is reported about these compounds.

2948A is the compound recommended for clinical trial because it seems less toxic and is easier to make. Preliminary clinical trials have been reported from Africa by SCHNEIDER and SANSARRICQ (1959) [*ibid.*, 1960, v. 57, 49] who found 2948A to be moderately effective against *Schistosoma haematobium* infections and to be free from major toxic effects.

[Further reports about the clinical value of these compounds will be awaited with interest.] *F. Hawking*

SPINGARN, C. L., EDELMAN, M. H. & BLACKBURN, M. *Schistosoma mansoni* **Ova: Their Demonstration in Mucus obtained by Digital Examination of the Rectum.** *New England J. of Med.* 1959, Dec. 17, v. 261, No. 25, 1281–2.

KHALIL and SALAH EL DIN [this *Bulletin*, 1930, v. 27, 963] found ova of *Schistosoma mansoni* in 93% of specimens of rectal mucus obtained by the rubber-gloved finger in 58 patients with schistosomiasis; in stool examinations ova were found in only 80%.

The present authors, from New York, describe a simple method of demonstrating ova in the rectal mucus. The index finger, in a latex finger-stall coated with water soluble lubricant jelly, is inserted into the rectum and the mucosa rubbed gently with the fingertip. The layer of mucus and faeces adhering to the finger-stall on withdrawal is removed with an applicator, mixed with saline and examined under a cover-slip.

They examined two groups of patients in this way and also examined one stool from each by direct smear and hydrochloric-acid-ether concentration. All the patients were Puerto Rican nationals; 12 were known to harbour live *S. mansoni* ova in the stool and 51 did not have ova in their stools (9 of them had been positive originally but had been cured).

S. mansoni were found in 10 out of the 12 patients with positive stools and in none of the negative controls. In 3 cases, ova were found in the rectal mucosa before they could be detected in the stools. Up to 10 ova could be found in each mucus specimen (6 contained 1 to 3 and 4 had 5 to 10). In 2

patients mucus specimens were obtained on 3 separate occasions at intervals of 1 to 7 days and all contained ova.

Schistosome ova were very easily found; so also were ova of other helminths and protozoal cysts (several patients had multiple infections). The findings for both groups of patients are tabulated.

The authors recommend this simple method for clinical purposes and as a screening procedure in surveys. *H. J. O'D. Burke-Gaffney*

Magalhães, A., Jr., Menezes, H., Da Silva, G. M. & Barbosa, J. de M. Ocorrência das cirroses hepáticas e da fibrose esquistossomose nas necrópsias do Departamento de Anatomia Patológica da Universidade do Recife. [**Incidence of Hepatic Cirrhosis and Schistosomal Hepatic Fibrosis in Autopsies in the Department of Pathological Anatomy in the University of Recife, Brazil**] *Anais Facul. Med. Univ. do Recife.* 1958, Dec., v. 18, No. 2, 207–13.

The authors studied the liver in 956 autopsies in Recife and grouped the findings according to the presence of (a) Laennec's diffuse cirrhosis, (b) post-necrotic cirrhosis, (c) schistosomal fibrosis (Symmers' " clay pipe stem " type), (d) splenomegaly (250 gm. or more), (e) oesophageal varices and (f) presence of *Schistosoma mansoni* eggs in the liver.

The results are discussed and set out in 3 tables [there is a reference in the text to table IV and figure 2, but these are not reproduced]. Fibrosis was found in 231 cases, consisting of 102 (44·15%) schistosomal, 62 (26·84%) post-necrotic and 57 (24·68%) Laennec type. The schistosomal fibrosis was accompanied by post-necrotic or Laennec fibrosis in 6 and 4 other cases respectively.

Oesophageal varices, splenomegaly or both together were found in 1·30%, 42·42% and 32·04%. They were commonest in the schistosomal fibroses, and were absent in such cases in only 12·74%, compared with 33·87% and 36·84% in post-necrotic and Laennec types.

Schistosome eggs were found in the liver in 376 autopsies (39·3%), namely 22·87% in the schistosomal type of fibrosis, 6·64% in the post-necrotic and 4·79% in the Laennec type. In those cases where eggs were present, splenomegaly was present in 34 (9·04%).

Schistosomal fibrosis was not found in subjects under 9 years old, but was commonest in those in the groups 10 to 19 and 20 to 29 years, after which there was a sharp fall and then a progressive decline in incidence.

The authors note that Laennec's cirrhosis was the least frequent of the 3 conditions, despite the presence of malnutrition in all the subjects studied.

H. J. O'D. Burke-Gaffney

El-Ghaffar, Y. A. & El-Ghaffar, M. A. **Methyl Androstenadiol in Schistosomal Cirrhosis of the Liver.** *J. Trop. Med. & Hyg.* 1960, Jan., v. 63, No. 1, 15–17.

Methyl androstenadiol was given in doses of 50 mgm. daily for a month to 11 patients with schistosomal cirrhosis in Egypt. Thymol turbidity, thymol flocculation, cephalin-cholesterol flocculation and zinc sulphate turbidity tests

and estimations of serum albumin, globulin, bilirubin and haemoglobin were performed before and after treatment.

The results obtained do not seem to be consistent. 2 [? additional] patients died of an intervening haematemesis and melaena. As a rule there was a rise in total serum proteins, chiefly in the form of serum albumin. This, the authors suggest, may indicate improved liver function. They think that an extensive study of the effect of this drug on this and other forms of hepatic cirrhosis is desirable. *A. R. D. Adams*

MAGALHÃES, A., Jr. **Pulmonary Lesions in Mice experimentally infected with** *Schistosoma mansoni*. *Amer. J. Trop. Med. & Hyg.* 1959, Sept., v. 8, No. 5, 527–35, 11 figs. on 2 pls. [24 refs.]

The experiments were designed to investigate the degree of tissue reaction to schistosomulae in the lungs of mice already infected with *Schistosoma mansoni* compared with that in mice exposed to their first infection. Of 40 mice experimentally infected 90 days earlier, 30 were re-exposed, each animal receiving 200 cercariae. The remaining 10 mice were reserved as controls. Another group of normal mice were infected for comparison. The 30 re-infected mice and 20 re-infection controls were killed and examined at intervals from 2 to 40 days after infection. The 10 primary infection controls were killed at 120 days from infection. At autopsy all mice were examined for gross and microscopical manifestation of pathological change in the lungs.

None of the 10 control mice infected 120 days earlier showed any pulmonary lesions except those produced by schistosome eggs. In the 20 re-infection controls schistosomulae were found in the pulmonary vessels up to the 8th day after infection but little histopathological change was apparent at this time and none thereafter. In re-infected mice large areas of congestion were apparent on the 2nd day after re-infection with marked inflammatory infiltration around small arteries and arterioles. No dead schistosomulae were found at this time. Up to the 30th day after re-infection live and dead schistosomulae were found in the lungs; inflammatory reaction of the lung parenchyma was diffuse up to the 8th day and more localized thereafter; vascular lesions became apparent from the 6th day, commencing with inflammation of the endothelium and later developing fibrinoid degeneration, endothelial proliferation, thrombosis and fibrous thickening of the intima.

The author contends that retention and destruction of parasites in the lungs occurs only in re-infected "premunized" animals. *O. D. Standen*

SHIAO, Shu-Hwa, YANG, Yuan-Ching, LOH, Wen-Chu, CHOW, Hou-Yuan & MAO, Shou-Pei. [**Studies on the Effect of Pumpkin Seed on Experimental Schistosomiasis japonica**] *Acta Pharmaceutica Sinica*. 1959, Nov., v. 7, No. 8, 300–310, 15 figs. on 3 pls. [In Chinese.] English summary.

Pumpkin seeds have been sometimes used in the treatment of taeniasis [this *Bulletin*, 1951, v. 48, 821; 1956, v. 53, 901, 902]. The present authors, from Shanghai, have studied the action of 2 varieties, *Cucurbita moschata* var. *melonaeformis* and *C. m. toonas* in experimental schistosomiasis in albino mice.

100 mice were each infected with 40 cercariae of *Schistosoma japonicum* and were each given 3 gm. daily of pumpkin seeds by mouth, in 4 groups which were treated respectively for 1, 2, 3, and 4 weeks from the day of infection. Two similar groups were treated respectively one week before and one week after infection. The mice were killed and examined for worms after 5 weeks.

The best results were obtained in the group treated for 4 weeks from the day of infection. However, no curative effect was observed on mature schistosomes or on egg deposition, but when simultaneous intraperitoneal injections of tartar emetic in subcurative doses were given to mice with mature infections, a synergic effect was evident. It was shown that *C. m. melonaeformis* was more potent in reducing worms in the mice (90·8%) than *C. m. toonas* (60·2%).

63 different extracts from pumpkin seeds were tested in infected mice; the most potent proved to be the oil-free powder, the aqueous and the acetone extracts.

When pumpkin seeds were given to infected mice, the pulmonary stage of young schistosomes lasted much longer than usual, the development of schistosomulae was much retarded and " they were destroyed during the early stage of their hepatic cycle ".

During treatment hepatic glycogen levels decreased gradually but fatty globules increased greatly; both reverted to normal when treatment was stopped. The glycogen content of the adult worms was not seen to be changed during treatment.

[This abstract is based on the authors' summary in English.]

H. J. O'D. Burke-Gaffney

TSUDA, M. [**Biological Studies on** *Paragonimus westermani*. **1. On a New Technique for Collection of the Metacercariae of** *Paragonimus westermani* **from the Second Intermediate Host and on the Distribution of the Metacercariae in** *Eriocheir japonicus* **by this Technique**] *Japanese J. Parasit.* 1959, Oct., v. 8, No. 5, 805–11. [15 refs.] [In Japanese.] [**2. On the Resistance of the Metacercariae of** *Paragonimus westermani*] *Ibid.*, 812–21, 12 figs. [17 refs.] [In Japanese.]

The English summaries appended to the papers are as follows:—

i. " Despite the large amount of work on the distribution of metacercariae of lung fluke, *Paragonimus westermani* in *Eriocheir japonicus*, the second intermediate host of the fluke, the method commonly employed for collection of metacercariae in the crab is time-consuming and no good for collecting them in the muscle of crabs. The present studies were, therefore, undertaken in an attempt to devise a new simplified and effective procedure for collection of metacercariae by the use of meat-grinder. The soft tissue of crabs without exoskeleton was minced in a meat-grinder. Minced soft tissue was then filtered through the metal sieves with 20 mesh and then with 40 mesh again. The filtrate was washed repeatedly with water by sedimentation. Large numbers of metacercariae would be contained in the final sediments. Intact metacercariae thus obtained may be used in various investigations, excystation, development and culture of these juveniles.

" The results obtained from the comparison of the newly devised method with the commonly employed one were as follows:

" 1) The incidence of metacercaria in some parts of crabs examined was arranged in the following order: trunk (cephalothorax and abdomen) > foot > gill. Ratio of number of metacercariae collected in each part of crabs was as follows: trunk: foot: gill = 2·1:1·6:1·0.

" 2) Out of 258 crabs examined, 10% of them were negative for metacercariae in the gill and simultaneously positive in other parts than the gill.

" 3) Only two cases of crabs were positive in the gill and simultaneously negative in other parts.

" 4) In the case of 11 crabs examined by both newly devised method and commonly employed one the number of metacercariae detected by the former was larger than that by the latter."

ii. " The accumulation of knowledge about the resistance of metacercaria of lung flukes to many kinds of substance has been reported fragmentally. In the present study a further effort was made to detect the resistance of metacercaria of *Paragonimus westermani* to the physical and chemical agents. The results obtained were as follows:

" 1) Metacercariae were killed by heat as high as 50°C. or more in a short period and survived for a long period at 0°–2°C.

" 2) They survived for around 10 days in water or moistened chamber showing difference of survival period between in spring and in summer.

" 3) 0·4–0·85% saline and 0·5–1·0% sodium bicarbonate solution in both of which metacercariae could survive long time may serve as media for their maintenance.

" 4) Anti-metacercarial activity of disinfectants tested increased in the following order: phenol < cresol < mercury bichloride. Characteristic response occurred in metacercariae exposed to 50% alcohol solution.

" 5) Relatively high resistance of metacercariae to strong acids was observed and metacercariae were killed by 0·2% HCl in 24 hours.

" 6) Movement of metacercariae was stopped by formalin in a short period and no morphological changes had occurred in two weeks.

" 7) Metacercariae were killed by an exposure to 3–5% sodium hypochloride within two hours.

" 8) The response of metacercariae to a given agent was variable under the same outer conditions. This variance is presumably due to the difference in maturity between metacercariae."

SCHLESINGER, F. G. Een geval van distomatose in Nederland. [**A Case of Distomatosis in the Netherlands**] *Nederl. Tijdschr. v. Geneesk.* 1960, Feb. 6, v. 104, No. 6, 285–6.

The English summary appended to the paper is as follows:—

" Description of a patient operated upon for duodenal ulcer and cholecystitis, in whom *Distomum hepaticum* (*Fasciola hepatica*) was found in the common bile duct."

KAIPAINEN, W. J. & IKKALA, E. **The Metabolic Activity of** *Diphyllobothrium latum* **and its relation to " Viable Ova ".** *Ann. Med. Intern. Fenniae.* Helsinki. 1959, v. 48, No. 4, 191–6, 1 fig. [10 refs.]

GHERMAN, I., HÎRDĂU, V., BOBOŞ, M., LUSCALU, A. & BUTAN, I. Un episod epidemic de tichinoză determinat de consumarea unei cărni infestate de urs. [**An Epidemic Episode of Trichinosis due to the Ingestion of Infested Bear's Meat**] *Microbiol., Parazitol., Epidemiol.* Bucharest. 1959, Sept.–Oct., v. 4, No. 5, 453–6. English summary (8 lines).

9 people were involved and 1 died.

RAKOWER, J. [**Epidemiology of Echinococcosis in Israel**] *Harefuah*. Jerusalem. 1960, Jan. 15, v. 58, No. 2 [in Hebrew 39–42. (33 refs.) English summary 42].

The English summary appended to the paper is as follows:—

"About one hundred cases of echinococcosis are reported in the last year in Israel; the echinococcosis morbidity rate is thus 5 per 100,000. However, it should be emphasized that only 40% of these patients became infested in this country, whilst the remaining patients bring their disease from foreign countries particularly from Iraq, North-Africa and Yemen. The morbidity rate of autochthonous echinococcosis is therefore not higher than 2 per 100,000.

"It must be pointed out, too, that 80% of autochthonous cases come from 4 districts: Beer-Sheva, Ashkelon, Kinnereth and Safad, with a total population of 200,000. The presumptive morbidity rate in these areas reaches 16 per 100,000, a rate which is even higher than that of Cyprus or Sardinia—classical endemic countries.

"The highest hydatid morbidity rate among domestic animals is observed in Beer-Sheva (12%) and in Safad (10%), while in Tel-Aviv it reaches 0·02% only.

"Preventive measures and education on hygiene of the population of the affected areas are strongly recommended."

GEMMELL, M. A. **The Fox as a Definitive Host of *Echinococcus* and its Role in the Spread of Hydatid Disease.** *Bull. World Health Organization.* Geneva. 1959, v. 20, No. 1, 87–99. [29 refs.]

The part played by the fox in the epidemiology of hydatid disease in man and in animals is assessed on evidence available from field surveys and laboratory investigations. It is becoming increasingly clear that the fox is the definitive host of *Echinococcus multilocularis* which occurs in Europe and Asia, and the Islands of the Bering Sea and in Alaska and which in man causes alveolar hydatid. Such evidence concerning the morphological differentiation of the adult worms *E. multilocularis* and *E. granulosus* as is completely reliable, strongly suggests that the fox is not a definitive host of *E. granulosus* which causes the common cystic form of hydatid disease.

The European red fox was imported into Australia in 1886 and the author, working in Australasia, showed experimentally that a few tapeworms of the Australian strain of *E. granulosus* could become established in some of the foxes but were retarded in growth as compared with their growth in dogs, and they failed to reach sexual maturity. It is unlikely, therefore, that the fox plays any part in the maintenance of *E. granulosus* in Australia.

2 autochthonous cases of doubtful alveolar hydatid disease have occurred

in man in Australasia, though the typical infiltrative and metastatic features of aveolar hydatid were lacking. If these were true alveolar hydatids, they may have occurred as accidental infections of *E. multilocularis* which may have been imported temporarily to die out later, or from a cycle of infection which may be maintained at a low level in some intermediate host which has, so far, escaped detection. Alternatively, the 2 cases may be due not to infection with *E. multilocularis* but to *E. granulosus* which, in these particular instances, has undergone pleomorphism in the cystic stage.

[This excellent article reviews in detail the evidence accumulated particularly during the last 6 years which has led to a real understanding of the epidemiology of the two forms of hydatid infection in animals and their occurrence in man.]

W. E. Kershaw

Popow, J. Bąblowiec wielokomorowy wątroby i płuc. [*Echinococcus multivesicularis* **of the Liver and Lung**] *Wiadomości Parazytologiczne*. Warsaw. 1959, v. 5, No. 6, 563–7, 3 figs. [14 refs.] English summary (6 lines).

Saif, M. **On Some Haematological Aspects in Ancylostomiasis.** *J. Ministry of Health*. Cairo. 1959, Oct., v. 1, No. 2, 13–17.

The author proposes to compare mildly with severely affected subjects of hookworm disease, but does not give any data on this potentially interesting subject, except to note that in 3 severely affected subjects the ^{51}Cr half-life of the erythrocytes was slightly reduced. Even this he regards in at least one case as possibly due to inaccuracy in measurement with low red-cell volumes. Haemoglobin levels are listed for 3,242 patients with parasitic infections and 972 without them; the lowest levels were found when ankylostomiasis was present. *Alan B. Raper*

Layrisse, M., Blumenfeld, Norma, Dugarte, Iris & Roche, M. **Vitamin B_{12} and Folic Acid Metabolism in Hookworm-Infected Patients.** *Blood*. 1959, Dec., v. 14, No. 12, 1269–79, 4 figs. [24 refs.]

Venezuelan patients with hookworm diseases were studied. Serum B12 estimation in 18 heavily infected subjects showed levels varying from about 50 to 300 $\mu\mu$gm./ml., while in 8 of these subjects the level fell below 100 $\mu\mu$gm./ml. But even in the latter, the Schilling test for B12 absorption was normal. Lightly infected subjects gave results within the normal range.

Tests with folic acid in 13 heavily infected patients revealed normal absorption in only 1 case, impaired absorption alone in 6, and malabsorption with diminished storage in 5. In 2 out of 10 patients re-tested after thorough worming the folic acid absorption was corrected. In all patients the bone marrow was normoblastic, and the response to iron therapy was good.

The authors are not fully satisfied of the adequacy of their folic acid tests; but, accepting their tendency, they feel that they cannot ascribe any folic acid deficiency wholly to a deficient diet accompanying heavy hookworm infection, because they found satisfactory absorption in their group of lightly infected subjects, who took an equally poor diet. *Alan B. Raper*

NAGATY, H. F. & RIFAAT, M. A. **Clinical Trials with Bephenium Hydroxynaphthoate against *Ancylostoma duodenale* and other Helminthic Infestations.** *J. Trop. Med. & Hyg.* 1959, Nov., v. 62, No. 11, 255–8. [10 refs.]

The authors carried out a field trial on the efficiency of Alcopar [this *Bulletin*, 1959, v. 56, 639] in a village, Barnasht, 40 kilometres south of Cairo. Previous surveys had shown an incidence of infection by *Ancylostoma duodenale* of 50%, while Stoll counts on 20 infected patients before treatment gave a high concentration of ova of 200 or more per gm. of faeces.

The dosage used was 5 gm. of bephenium hydroxynaphthoate containing 2·5 gm. of bephenium base, given 2–3 hours after breakfast, without any form of purgative or preliminary starvation. This dosage was used irrespective of age and weight, and was given in a draught of 60 ml. of water. It was well tolerated, even by 6 patients having a haemoglobin concentration below 50%, by 4 pregnant women, 1 man with amoebiasis and by 1 patient suffering from infective hepatitis.

The results obtained were highly satisfactory in so far as *A. duodenale* was concerned. 93·3% of patients had ceased to pass ova within 10 days of treatment, and the faeces of 95·4% were free from ova within 3 weeks. In 2 patients showing a concomitant *Ascaris* infection, this was also eliminated. The drug also appeared to be effective against *Trichostrongylus*, for among 23 patients with this infection, 18 had been freed within 10 days and another within 3 weeks. 4 out of 8 infections with *Hymenolepis nana* were eliminated within 3 weeks but a single patient infected with *Taenia saginata* continued to pass segments throughout the period of observation.

The 4·6% of patients who were still passing *A. duodenale* ova 3 weeks after treatment showed a marked reduction in the egg count.

The authors conclude that Alcopar is even more effective against *A. duodenale* than against *Necator americanus* [*loc. cit.*], is completely safe and is free from unpleasant side effects. *J. H. Walters*

AHMAD, N. & RASOOL, G. **Bephenium Hydroxynaphthoate against Hookworm in West Pakistan.** *J. Trop. Med. & Hyg.* 1959, Dec., v. 62, No. 12, 284–5.

"Hookworm disease" is highly prevalent in several districts of West Pakistan. A survey by the Public Health Department of the former Punjab Province showed an incidence of more than 80% in the Sialkot district and between 40 and 60% in at least 5 other districts; but the intensity of the infections was low—from 100–324 eggs per gm. of stool. In Lahore AHMAD (*Pakistan J. Med. Res.*, 1959, v. 2, 2) found an average infection rate of 12·92% and an intensity of 480·5 eggs per gm. CHANDLER [this *Bulletin*, 1928, v. 25, 932] had found an infection rate of 16%. Anti-hookworm campaigns have been in progress since 1952, routine treatment being 30–40 minims of tetrachlorethylene mixed with 2 oz. of $MgSO_4$ solution. Side effects due to tetrachlorethylene were very frequent and people were therefore not willing to take it.

Seeking a safer and more acceptable remedy the authors tried bephenium hydroxynaphthoate (Alcopar, Burroughs Wellcome & Co.) which, it has been claimed, is more effective than tetrachlorethylene and causes no side effects [*ibid.*, 1959, v. 56, 639].

The authors gave this drug to patients with hookworm in doses of 5 gm. of the powder suspended in 1·5 oz. of water on an empty stomach in the morning, no food being given till about 3 hours after the dose and $MgSO_4$ being given 2 hours after the dose. As a control every alternate patient found positive by stool examination was treated with tetrachlorethylene. The intensity of the infections was tested before and after treatment by the Stoll egg-counting method, eggs in 4 slides being counted and the average taken. Before the doses only 1 stool was examined and patients found positive were treated; the stools were examined 7 days after the dose. When patients were found to be positive after the dose, any reduction in the intensity of the infection was estimated. In both groups most of the patients were adults, but their ages varied from 4 to 60 years. The intensity of the infections varied from 50 to 4,000 eggs per gm., but most of them were light.

The results were as follows:

	Numbers of Patients							
Drug	Began treatment	Examined after first dose	Negative after first dose	Mean % reduction of egg-count in positives	Examined after second dose	Negative after second dose	Mean % reduction of egg-count in positives
Bephenium hydroxynaphthoate	78	74	61 (82·4%)	58·0	10	8 (Total, 93·2%)	75·0
Tetrachlorethylene	72	65	12 (18·5%)	22·6	15	1 (Total, 20%)	43·3

Of 5 patients positive after 2 doses of tetrachlorethylene, 2 became negative after a third dose and of 2 given a fourth dose only one became negative.

Adult worms (454 male, 924 female) were found in patients given bephenium hydroxynaphthoate, all of which were *Ancylostoma duodenale*, except 2, which were *Necator americanus* (1 male, 1 female).

Among the patients given bephenium hydroxynaphthoate only 2 had side effects (nausea, vomiting, giddiness and, in one, palpitation), but both were very anaemic and one had 4,000 ova per gm., the other 1,000 ova per gm. Among the 72 patients given tetrachlorethylene 40 had side effects.

The authors conclude that bephenium hydroxynaphthoate is a much more effective drug than tetrachlorethylene and that side effects are rare.

G. Lapage

See also p. 445, HALLINAN, **Drug Resistance in Malaria.**

ZDZIENICKI, S. Wystepowanie jaj pasożytów przewodu pokarmowego na warzywach. **[Eggs of Digestive System Parasites on Vegetables]** *Roczniki Państwowego Zakładu Hig.* Warsaw. 1959, v. 10, No. 6, 541–6, 2 figs. [16 refs.]

The English summary appended to the paper is as follows:—

"The aim of the research was to prove the pollution of vegetables with eggs of digestive system parasites. From September, 1957 till April, 1958 the author has examined 117 vegetable samples: 70 samples of carrots and 47 samples of

beets. Pollution of these vegetable samples with eggs of digestive system parasites was 41·1% for carrot and 53·2% for beet. The eggs of *Ascaris* sp., *Enterobius*, and *Trichuris* have been found most frequently."

BUEDING, E., SAZ, H. J. & FARROW, G. W. **The Effect of Piperazine on Succinate Production by** *Ascaris lumbricoides*. *Brit. J. Pharmacol. & Chemotherapy*. 1959, Dec., v. 14, No. 4, 497–500, 1 fig. [13 refs.]

Ascaris worms produce succinate *in vitro*; but if they are incubated with piperazine in concentrations (0·05–0·1%) sufficient to cause paralysis, the production of succinate is inhibited by about 50–60%. The inhibition is temporary, and if the worms are moved to fresh medium the production of succinate increases to its original level. *Ascaris* muscle incorporates lactate into succinate. By the use of lactate labelled with ^{14}C, it was shown that this incorporation was not inhibited by piperazine. It is considered that the production of succinate supplies energy for the contraction of *Ascaris* muscle and that piperazine blocks the myoneural junction, leading to diminished muscular activity which leads to diminished production of succinate.

[See also this *Bulletin*, 1958, v. 55, 428.] *F. Hawking*

VORA, D. D. & VASI, H. T. **Comparative Study of Vermifuge Action of Different Salts of Piperazine in Ascariasis.** *J. Indian Med. Ass.* 1959, Oct. 16, v. 33, No. 8, 317–20. [10 refs.]

The authors review the published information on the relative efficiency of various salts of piperazine in clearing the gut of *Ascaris lumbricoides* and note a lack of accord in the results recorded. Consequently they decided to carry out a comparative trial of 4 salts, the citrate, adipate, tartrate and phosphate of piperazine in a municipal hospital in Bombay. The drugs were administered in the form of a syrupy emulsion containing 500 mgm. of the base per drachm, as a single dose, in the following dosage:—children up to 6 years—2 drachms = 1 gm. of base; 6–12 years—4 drachms = 2 gm.; above 12 years 6 drachms = 3 gm. of base. After a normal evening meal the drug was given at 2 a.m., while at 6 a.m. an enema was administered. Subsequently every stool passed was examined for *Ascaris* during the next 4 days: failure to pass worms during this period was regarded as a negative result. The only criteria of selection for trial were the passage of *Ascaris* ova and fitness to receive an enema. No later follow-up studies were carried out [so that the completeness of elimination could not be assessed].

The following results were obtained:—

(a) Piperazine citrate	112 patients	positive result in 53 (47·32%)
(b) „ adipate	100 „	„ „ „ 34 (34%)
(c) „ tartrate	130 „	„ „ „ 30 (23·08%)
(d) „ phosphate	100 „	„ „ „ 20 (20%)

A statistical analysis showed that both the citrate and the adipate gave significantly better results than the other two salts. The success of each salt

tended to decline with increasing age of the patient. A further observation was that whereas the action of the tartrate and phosphate salts appeared to harden the cutis of the worms and thus render them rigid, the worms expelled under the action of the other two salts remained supple and pliable.

[The overall results obtained in this admittedly incomplete therapeutic trial are disappointing, but, since no follow-up stool examinations for *Ascaris* ova were undertaken, the final effect of the drugs cannot be assessed. The citrate and the adipate emerge as having the more efficient immediate action, and the relative inefficiency of the tartrate and phosphate may be related to their hardening effect on the cutis of the worm, rendering it more difficult to expel.]

J. H. Walters

VILLAREJOS, V. M. & SALDAÑA, J. **Mass Deparasitization Experiment with Dithiazanine Iodide.** *Antibiotic Med.* New York. 1959, Dec., v. 6, No. 12, 718–23.

The authors tested (in the form of Delvex tablets supplied by Eli Lilly & Co.) dithiazanine iodide, the literature on which is briefly summarized, as a means of deparasitizing the homogeneous rural population of about 400 Mozetene Indians living at Covendo, Bolivia. This fairly well isolated and ill-nourished community has a poor water supply, uses its own faeces as fertilizer and suffers from tuberculosis, malaria, amoebiasis and helminthiasis. The authors examined 354 persons (214 adults and 140 children aged 5 to 16 years) and 352 of these were treated. Adults and children over 10 years old were given, for 5 days, daily doses of 3 tablets, each containing 200 mgm. of dithiazanine iodide; children between 5 and 10 years old were given only 2 tablets daily for 5 days. Children under 5 years were not treated because of the difficulty of administering the drug to them.

The patients were examined by brine concentration of helminth eggs at the end of treatment and a month later, clinical examinations being made at the same time. Egg counts were not done, but the number of eggs was estimated and recorded as "one to four plus for each species found". The patients followed their normal lives without purgatives, special diet or additional doses of the drug.

Clinical examination showed that a large majority of the patients had anaemia, probably due to malaria or multiple intestinal parasites, or to both. It also revealed nutritional deficiencies, gastrointestinal troubles, geophagia, bradycardia, poor physical development and, in children, mental retardation.

The chief nematodes found were *Ascaris lumbricoides*, *Trichuris trichiura*, *Strongyloides stercoralis* and *Necator americanus*, most of the infections being severe. The enquiry was limited to these species. Multiple infections were found in 340 patients; 175 had four species of helminths, 120 had three and 45 had two, only 12 having 1 species.

Expulsion of the worms began in several patients 24 hours after the beginning of treatment and in all other patients it occurred on the second or third day and continued till treatment ended. Some patients expelled 30 or 40 ascarids, all stained intensely blue, during the first day of treatment. Tables I and II give the results. Of 320 patients infected with *A. lumbricoides*, 310 were negative after 5 days of treatment and 305 were still negative a month

later, the percentage cure rate of these being 95·3 ± 1·18. As many children as adults responded in this way. Of 286 patients with *T. trichiura* 284 were negative at the end of treatment and 280 were negative a month later, the percentage cure rate in these being 97·9 ± 0·85. Children and adults expelled this worm also in a similar way. Of 241 patients with *Strongyloides stercoralis* 186 expelled all the worms and were still negative a month after treatment ended, the percentage cure rate in these being 77·1 ± 2·7. The drug was slightly more effective against this species in adults (82·7%) than in children receiving the lower dose (63·4%). Of 311 patients with *Necator americanus* only 52 were negative at the end of treatment, but 73 were negative a month later, the percentage cure in these being 23·4 ± 2·4. The drug was more effective in children receiving the smaller dose (35·3%) than in adults (21·2%) and older children (20·9%). 3 patients with *Hymenolepis nana* who received the higher dose, and 2 with *Taenia solium* expelled all these worms and were negative a month after treatment ended; but 1 patient with *T solium* did not become completely negative.

The drug was well tolerated. Intense vomiting necessitated suspension of treatment 5 times, but subsequently smaller doses were fairly well tolerated by these patients. In 8 cases signs of gastric irritation ceased when the drug was given after instead of before meals; in 6 patients there was diarrhoea which did not interrupt treatment. 2 patients showed on the fifth day small petechial spots on the face and conjunctival suffusions, but these spontaneously disappeared.

The authors think that this drug makes it possible to produce by mass treatment a low parasite rate in populations heavily parasitized and its public health importance is emphasized. *G. Lapage*

Wysocki, E. & Nasiłowska, Maria. Wpływ niektórych pochodnych fenolu na jaja *Ascaris lumbricoides*. [**The Effect of some Phenol Derivatives on the Eggs of** *Ascaris lumbricoides*] *Wiadomości Parazytologiczne*. Warsaw. 1959, v. 5, No. 6, 569–75.

The English summary appended to the paper is as follows:—

"The authors describe the results of investigation on the influence of phenol derivatives on the eggs of *Ascaris lumbricoides*. A destructive effect on these eggs showed: 2,4-dichlorophenol, 2,5-dichlorophenol, 2,4,5-trichlorophenol and 2,2-dihydroxy-3,3′-5,5′-6,6′chlorodiphenylomethane."

Soulsby, E. J. L. & Coombs, R. R. A. **Studies on Blood Group Substances associated with** *Ascaris lumbricoides*. *Parasitology*. 1959, Nov., v. 49, Nos. 3/4, 505–10, 2 figs. [10 refs.]

"Human anti-A and anti-B and pig anti-A agglutinins were neutralized by *Ascaris lumbricoides* materials.

"The infection of pigs with *A. lumbricoides* stimulated the production of anti-A agglutinin but this agglutinin appeared to have no protective action.

"*Oesophagostomum dentatum* infection in pigs did not affect the anti-A agglutinin levels." [See this *Bulletin*, 1947, v. 44, 226, 729.]

FRIEDMAN, S. & HERVADA, A. R. **Severe Myocarditis with Recovery in a Child with Visceral Larva Migrans.** *J. Pediatrics.* St. Louis. 1960, Jan., v. 56, No. 1, 91–6, 1 fig.

"A Negro girl 2 years and 7 months old with visceral larva migrans is described in whom severe myocardial involvement occurred followed by complete recovery. This is the first clinical report of myocardial involvement associated with this parasitic infection with recovery of which we are aware. The diagnosis and management of this new complication of visceral larva migrans are briefly discussed"

See also p. 441, BASU, **A Note on Malaria and Filariasis in Andaman and Nicobar.**

RAGHAVAN, N. G. S. **Climate and Filaria.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1958, Sept., v. 6, No. 5, 137–45. [27 refs.]

WILLEMSE, J. J. *Culex fatigans* **from New Guinea and** *Aëdes polynesiensis* **from Samoa as Intermediate Hosts of** *Wuchereria bancrofti* **(Periodic Form).** *Trop. & Geograph. Med.* Amsterdam. 1959, Sept., v. 11, No. 3, 237–45, 9 figs. [13 refs.]

The experiments were done in an Amsterdam laboratory; laboratory-bred *Culex fatigans* (originally from Sorong in western New Guinea) and also *Aëdes polynesiensis* (from Samoa) were infected with *Wuchereria bancrofti* by feeding them on a man, from Surinam in South America, who had this infection.

Mosquitoes fed from 10 to 10.30 p.m. when microfilarial density in his blood averaged 8 per 20 cmm. The insects were kept then at 25°C. and 80% relative humidity.

Of 44 *Culex fatigans*, only 15 were positive for thorax or head forms; infective larvae appeared first on the 16th day. In two series of *Aëdes polynesiensis* development proceeded in step with that in *C. fatigans*, although some abnormality was evident in some larvae about the 6th day. Because all the *Aëdes* died at least within 13½ days no infective forms were seen in this species. Uninfected control series of the *Aëdes* also died within similar limits, so the filarial infection was not responsible. It is thought that *Aëdes polynesiensis* might well permit full filarial development.

Results are tabulated and there are photomicrographs of different stages of worm development. *D. S. Bertram*

VAN DIJK, W. J. O. M. **The Suitability of** *A. koliensis* **as an Intermediate Host for** *Wuchereria bancrofti.* *Trop. & Geograph. Med.* Amsterdam. 1959, Sept., v. 11, No. 3, 259–62.

Anopheles koliensis caught after feeding naturally, between 8 and 9 p.m., on 2 men infected with *Wuchereria bancrofti* (6–40 microfilariae per 20 cmm. and 178–206 per 20 cmm. finger blood) were dissected at intervals up to 11½ days or at earlier death. With the lighter human infection 19 of 36 females

contained developmental forms, 3 with mature larvae. Of 22 females examined after the heavier infecting meal, all but one were positive (1 negative female) and 4 females harboured mature worms. These were present as early as the 10th–11th day. 3 *Culex annulirostris* taken at the same time were negative up to 11½ days, and a mature larva was found in one of the 2 positive *A. farauti*. There was one negative female of this species. *A. koliensis* was the predominant species in the area of Hollandia where these observations were made.

Results are tabulated and the gradual growth of the worms indicates satisfactorily that the results do pertain to infections from the two infected human hosts. It is concluded that *A. koliensis* is an important vector of filariasis in inland areas of New Guinea. *D. S. Bertram*

RAGHAVAN, N. G. S **Congenital Filariasis.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1958, Sept., v. 6, No. 5, 147–54. [38 refs.]

NAIR, C. P., ROY, R. G. & RAGHAVAN, N. G. S. **Blood Groups and Filariasis.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1959, July, v. 7, No. 4, 119–21.

"1. The frequency of blood group of 981 persons with filarial disease only and 149 normal persons from same area showed no significant difference.

"2. This is at variance with the observation of Franks [this *Bulletin*, 1947, v. 44, 107] in persons with microfilariae."

JORDAN, P. **The Treatment of Bancroftian Elephantiasis and Observations on Hyaluronidase.** *J. Trop. Med. & Hyg.* 1959, Dec., v. 62, No. 12, 286–9. [30 refs.]

This review of the treatment of *Wuchereria bancrofti* elephantiasis does not claim to be exhaustive, but it indicates that no treatment can be relied upon to alleviate this condition.

The usual history given by persons with elephantiasis in East Africa is that the leg becomes swollen after an attack of lymphangitis and returns to normal when the attack has subsided. After further attacks the swelling gradually becomes permanent. Precautions should be taken by persons subject to lymphangitis to guard against knocks or other minor injuries; special care should be taken of the feet and attention paid to cleanliness, powdering of the feet and wearing of comfortable socks and shoes. KESSEL [this *Bulletin*, 1958, v. 55, 194] found the most efficient drug to be acetylsalicylic acid. Vaccines gave conflicting results [*ibid.*, 1928, v. 25, 997; 1931, v. 28, 50]. A less empirical method than vaccine treatment was the method of BOWESMAN (*Brit. J. Surg.*, 1938, v. 26, 86) who used glycerin by injections of 2–3 ml. of a 10% solution in an endeavour to draw fluid from the water-logged tissues into the circulation. Results were better from intra-arterial than from intravenous injections. From the work of GALLIARD and MILLE [this *Bulletin*, 1949, v. 46, 1064], and BEYE *et al.* [*ibid.*, 1953, v. 50, 738] it seems that diethylcarbamazine does not affect the established disease.

The introduction of steroids led to a number of trials being made to assess their effect on elephantiasis. MACFADZEAN [*ibid.*, 1954, v. 51, 297] reduced the

swelling as much as possible with bed rest and bandaging before treatment with corticotrophin. No further reduction occurred during drug therapy, but LAIGRET *et al.* [*ibid.*, 1958, v. 55, 430] reported success with cortisone and prednisone in all 10 patients in Tahiti, yet JORDAN (1959, in press) obtained improvement in only one out of 7 treated with prednisolone.

SUBRAMANIAN and RAMAMURTHI (*Antiseptic*, 1958, v. 55, 103) reported good or moderate reduction in elephantoid legs after treatment with sodium fluoride when used in conjunction with bandaging in 205 of 304 cases of less than 1 year's duration. It has been claimed that this drug acts by decalcifying filarial worms blocking the lymphatics and therefore lowers the high serum calcium. Estimations made on the sera of 19 persons with elephantiasis and a mean calcium value of 10·7 mgm. % was obtained, compared with 11·1 mgm. % in 22 controls. Chronic oedema of the legs has been successfully treated by FERRERO (*Minerva Med.*, 1952, v. 2, 801) with intra-arterial injections of hyaluronidase. The author tried it in elephantiasis as, in theory, the passage of fluid from the elephantoid tissue into the blood stream might lead to a reduction. Measurements were taken at pre-selected points before treatment. Injections of 3,000 units of hyaluronidase in 10 ml. of distilled water were given into the femoral artery daily for 10 days. Immediately after each injection a sphygmomanometer cuff above the knee was pumped up in an attempt to stop undue dilution of the drug in the circulation. No toxic reactions were noted, but the results were disappointing, and no lasting reduction in size resulted.

Another patient was treated by injection of the drug directly into the elephantoid tissue for a week. This produced a marked softening of the tissue, and when a pressure bandage was applied the limb was greatly reduced in size.

Most surgical methods for the treatment of elephantiasis are variations of Kondoleon's operation. Lymphangioplasty has been tried by MEHTA [*J. Indian Med. Prof.*, 1954, v. 1, 32] using polythene tubes stretching from the dorsum of the foot to well above the inguinal region and in the case of the arm from the hand to above the axilla. There is some evidence that this technique may be effective.

Bandaging by Knott's method [this *Bulletin*, 1939, v. 36, 152] and the use of Unna's paste bandages, continued for many months, probably represents the most satisfactory form of treatment available. *Philip Manson-Bahr*

RAICH, R. A. & GLEASON, D. F. **Pulmonary Symptoms and Eosinophilia due to Filariasis.** *Tubercle*. 1959, Dec., v. 40, No. 6, 462–5, 1 fig. [15 refs.]

Asthma, transient opacities of the lungs, adenopathy and eosinophilia may be associated with filariasis. Pulmonary symptoms are uncommon, but reports from Indonesia [this *Bulletin*, 1939, v. 36, 838] and from Indo-China [*ibid.*, 1954, v. 51, 1082 *bis*; 1957, v. 54, 1111] have shown that lymphadenopathy associated with asthma and a high peripheral eosinophilia, of 50 to 70% of the total leucocyte count, may occur.

This interesting case report concerns a 28-year-old farmer who entered hospital in Minnesota in September 1958 complaining of severe and progressive dyspnoea, wheezing and cough for 2 days. Similar attacks of lesser severity

had been noticed since 1954 when he first began to suffer from asthma on returning from 13 months service in South Korea. In 1957 a firm, painless mass was found in the left axilla. On admission an eosinophilia of over 50% was found, and left axillary lymph-node biopsy was interpreted as eosinophilic adenitis, possibly due to Hodgkin's disease. His temperature was 100·0°F., inspiratory and expiratory rhonchi and posterior basal râles were heard on both sides. A firm 5 × 3 cm. mass was found in the left axilla. The chest X-ray film showed linear markings in the lower zones consistent with focal atelectasis. The leucocyte count was 17,700 per cmm. with 74% eosinophils (the absolute count was 8,950 per cmm.). The ESR (Westergren) was slightly raised. A sternal marrow aspiration showed eosinophilia with normal maturation.

The axillary mass was excised and found to consist of one lymph node, measuring 5·5 × 4·0 × 2·0 cm. and two smaller ones measuring 8 and 12 mm. Microscopically there was benign hyperplasia of the reticulo-endothelium. Lymphoid follicles and germinal centres were numerous and prominent. Scattered haphazard were solitary granulomata consisting of epitheloid and multinucleated giant cells of the foreign body type. These granulomata surrounded irregular masses of eosinophilic material in which were embedded microfilarial larvae. The eosinophilic material gave a strongly positive periodic acid-Schiff test.

The diameter of the larva was 5–6μ with a single-layered basophilic wall about 0·2μ thick. The diameter suggests the microfilaria of *Wuchereria malayi* since *W. bancrofti* microfilariae average 8μ. As far as is known filariasis in South Korea is due to *W. malayi*.

The treatment initially was procaine penicillin and bronchodilators, with rapid clearing of pulmonary symptoms and chest X-ray abnormalities which soon returned to normal. As the eosinophilia still remained high, prednisone, 20 mgm. daily, and diethylcarbamazine, 2 mgm./kgm. were administered 3 times daily. After 21 days of the latter drug the patient was asymtomatic with a leucocyte count of 11,400 per cmm., of which 20% were eosinophils. 6 months later it had fallen to 5,350 per cmm. of which 9% were eosinophils. When seen 10 months later the patient was still without recurrence of asthma.

Philip Manson-Bahr

TURNER, L. H. & SODHY, L. S. **Studies on Filariasis in Malaya. A Trial Mass Treatment of *Wuchereria malayi* Filariasis with Single Daily Doses of Diethylcarbamazine.** *Ann. Trop. Med. & Parasit.* 1959, Sept., v. 53, No. 3, 268–73, 1 graph.

Since it had been observed in previous studies [this *Bulletin*, 1950, v. 47, 1213 ; 1960, v. 57, 157] that single daily doses of diethylcarbamazine adequate to clear the blood of *Wuchereria malayi* always resulted in febrile reactions of unpredictable severity, the authors planned a pilot trial to discover all the drawbacks that might be encountered in a large-scale filariasis control scheme. Their experiment was carried out in a small village, Sungei Batu, on Penang island, and included 156 persons living in 39 houses. A preliminary survey by thick blood film taken between 7·45 p.m. and 9 p.m. showed that 27% of this group, which included all ages over 5 years, carried microfilariae. Only 5 persons, however, gave a history or showed clinical signs indicative of filariasis. The local vector mosquitoes could not be identified.

The policy as planned was to administer single daily doses until a total of 100 mgm. per kgm. body weight had been achieved. The initial dosage was adjusted in inverse proportion to the density of the microfilaraemia, ranging from 0·5 mgm. per kgm. for those showing more than 30 microfilariae per 20 cmm., 1·0 for those showing 1–30, to 2 mgm. per kgm. for those whose blood showed no parasites. The dosage was built up as follows:—1, 2, 4, 8, 10, 12 mgm. per kgm. body weight, those showing febrile reactions receiving the same dose on the following day, while in some it was necessary to stabilize the maximum dose at a level lower than 12 mgm. per kgm. owing to intolerance.

Assessment of the results was seriously prejudiced by the high defaulter rate, and only 30% of the subjects received uninterrupted courses totalling 60 mgm. per kgm. or more. Only 9 of the 35 microfilaria carriers and only 6 out of the 20 who showed febrile reactions [indicative of a cryptic infection] attended thus regularly. However, the work was continued with perseverance up to the 48th day, by which time 134 persons had received a total dosage of more than 40 mgm./kgm., though with 1 or more interruptions.

All subjects carrying microfilariae experienced febrile reactions though these were never so intense as to cause interruption of voluntary treatment. The authors were surprised to note febrile reactions in 20 out of 105 persons with negative blood, and concluded that these were examples of a cryptic infection. There were no local reactions such as lymphangitis or lymphadenitis. Side effects comprised anorexia, vertigo, vomiting, colic associated with the passage of *Ascaris*, and somnolence. These effects were never severe or common, though adults were affected more often than children.

Surveys of night blood were repeated at 4 weeks and 41–42 weeks after the start of the trial. A satisfactory clearance rate was demonstrated, for only in 2 cases were persistent infections found at 4 weeks. Of these one left the district, while the other, whose microfilaria concentration had fallen from 37 to 1 per cmm. was cleared by a second course totalling 69 mgm. per kgm. Those whose blood was cleared of microfilariae had received a total of at least 60 mgm. per kgm. body weight.

The authors conclude that such a schedule of treatment is impracticable as a large scale policy [see, however, this *Bulletin*, 1958, v. 55, 922].

J. H. Walters

HASSAN, M. Y. B. **The Filariasis Campaign in Kedah.** *Med. J. Malaya.* 1959, Sept., v. 14, No. 1, 36–46, 2 figs. & 2 maps.

The Kota Area is situated between the mouths of the rivers Sungei Muda and Sungei Merbok with two smaller rivers in between. Consequently the area is almost completely swamp and rice is the principal crop. On the other side of Sungei Merbok is the Merbok Area, with practically the same terrain. Investigations carried out from 1949 to 1954 showed the highest microfilaria rate in the Kota Area to be 50·6% at Kampong Simpor Kechik and in the Merbok area 32% at Kampong Sungei Pial.

The filariasis campaign was started in the Kota Area which has a population of about 4,000 in an area of approximately 20 square miles. Rice fields occupy the area towards the sea while swamps occupy most of that in the east, leaving a narrow strip in the middle. The houses are massed on both sides of the road. To the north the country is hilly and rubber the principal crop. The

area towards the coast is damp, the houses are scattered, and there are numerous borrow pits, fishponds, wells and roadside drains. The inhabitants are all Malays, living in the kampong manner.

Before instituting control a house-to-house census was made. Particulars of the inhabitants and histories of clinical filariasis were registered.

Blood surveys were made before control, 7–12 months after completion of drug treatment and in a few areas after a lapse of two years. Blood films were stained with dilute Giemsa. The standard was 20 cmm. of blood, and the highest count was 122 microfilariae of *Wuchereria malayi*. Kampong Sungei Meriam near the coast had the highest rate of 35·9%. The overall percentage in the Mukim Bukit Meriam was 26·2 and the density 2·59 per 20 cmm. The lowest age infected was 2 years with a carrier rate of 3·4% in both sexes. Thereafter the percentage sharply increased until it reached a peak of 53·8% in the 13-year age-group. The highest percentage (54·5) was in the age-group 35–39 years (males): in the remaining groups the carrier rate fluctuated between 25 and 40%. Males had a higher rate than females. The highest elephantiasis rate was 7·7% and males predominated. No cases of elephantiasis were observed below the age of 15 and the greater number were over 40.

The insect vectors of *Wuchereria malayi* were *Mansonia uniformis* and *M. annulifera*, and were breeding in swamps, borrow pits, wells and deep drains. House-to-house residual spraying, with dieldrin at 40 mgm. per sq. foot, was carried out once every 6 months. Anti-larval measures consisted of removal of all water plants and water-hyacinths (*Eichornia crassipes*). The Water-hyacinth Extermination Enactment was introduced.

For mass treatment the drug used was diethylcarbamazine di-hydrogen citrate, in 50 mgm. tablets. The salt contains about 51% of the base. To infants and young children the drug was given in the form of a syrup containing about 30 mgm. per fluid drachm. The drug was given in single doses of 5 mgm. per kgm. at weekly intervals for 6 weeks (total dosage was 30 mgm. per kgm.). At the start only half the population was given the first dose, but at the second treatment the entire population received the drug.

Practically all persons with microfilaraemia had reactions; these included fever (102°–103°F.), severe pains, nausea, vomiting, lymphangitis, dyspnoea and adenitis, relieved by aspirin or aspirin-phenacetin-caffeine tablets. Anthisan was administered to patients who had more than 30 microfilariae per 20 cmm. blood.

The development of lymphangitis and adenitis during the third or fourth week was interesting. Some cases were so severe as to necessitate surgical incision and some developed into abscesses.

The final results were encouraging. Before treatment 26% of the 3,227 persons examined (849) showed microfilariae. At the survey made 7–12 months after cessation of treatment only 46 of the whole population were found to be positive and the carrier rate had dropped from 26·0% to 1·47%. The microfilaria density was reduced from 2·59 to 0·18 per 20 cmm. Two years after treatment a second survey was made in 4 kampongs and the results were as follows:—before treatment 887 were examined, microfilaria rate was 23%, mean number of microfilariae per 20 cmm. was 3·36; 7–12 months after treatment the microfilaria rate was 2% and the microfilarial density 0·22; 2 years after treatment the figures were 0·5% and 0·02.

It was difficult to record the effects of the drug on the clinical attacks, but

the incidence of elephantoid fevers was reduced. There was no indication that the established signs of elephantiasis were in any way altered. It would therefore seem that a single mass treatment had reduced the microfilaria rate by 95% in the first year. The author states that the results are much better than those obtained by WHARTON *et al.* in Pahang [this *Bulletin*, 1959, v. 56, 191], possibly because of the higher percentage of the population treated, the lower infection rate and the apparent absence of an animal reservoir in the Kota area. *Philip Manson-Bahr*

SASA, M., HAYASHI, S., SATO, K., IKESHOJI, T. & TANAKA, H. **A Review of Field Experiments in the Control of Bancroftian and Malayan Filariasis in Japan, 1958.** *Japanese J. Exper. Med.* 1959, Oct., v. 29, No. 5, 369–405, 5 figs. [21 refs.]

An account is given of a number of experiments in the control of human filariasis conducted in endemic areas of *Wuchereria bancrofti* in southwest Japan and of studies on the control of *W. malayi* filariasis initiated in 1950 at Hachijo-Koshima.

Various systems of diethylcarbamazine therapy were applied at different localities as follows:

(A) Daily treatments of 10 days' duration with 2 mgm./kgm. of the drug. This reduced the microfilarial counts to about 5% of the original. After suspension of treatment, counts gradually increased to about 10% in several months, but not to the status recorded before treatment commenced.

(B) Weekly doses of the same order. This reduced the microfilarial counts very slowly, but they finally became as low as 3·90% after 9 weeks. As before, counts tended to rise again after suspension of treatment. With monthly doses at the same level the effect was much slower.

(C) Combined system of daily administration for 5 days, followed by 10 supplementary doses at intervals of 10 days. This resulted in a decrease to an average of 0·78% on completion of treatment, though here also the counts tended to rise again after treatment was suspended.

For the mass treatment of filariasis it is recommended to administer diethylcarbamazine on the combined system, so as to attain prompt reduction of microfilariae by the initial doses in a short period and to maintain them at lower levels by the supplementary doses given at longer intervals.

Residual spraying with dieldrin or DDT was effective in reducing mosquito populations for a long period. There was evidence of some resistance to both these insecticides and to lindane on the part of *Culex pipiens pallens* in a few areas, but this has hitherto proved of little practical importance. Resistance of house-flies to these insecticides here as elsewhere has proved a serious problem. *G. Covell*

BORODA, C. **An Investigation into the Incidence of Onchocerciasis in a Community exposed to Infection.** *East African Med. J.* 1959, Nov., v. 36, No. 11, 610–12.

The author, who is senior medical officer in Kilembe Mines in Kenya, carried out a study among European and Asian employees and their families to discover

whether they were suffering from onchocerciasis, as they were exposed to biting by infected *Simulium*. Entomological studies had shown that the vectors were widely distributed along the Ruwenzori foothills, and also 728 skin biopsies from Africans in the Kilembe area were positive in 91% of cases.

During a period of severe drought in Kilembe, *S. damnosum* were biting at a rate of 15 flies per boy-hour in the early morning (90% nulliparous) and 4 per boy-hour in the late afternoon (36% parous). In the neighbouring river valleys, the biting rate was more than 100 per boy-hour. The reduced biting activity at Kilembe was attributed to industrial pollution (340 parts per million) of the local rivers which interfered with the feeding economy of the aquatic pre-adult stages of *S. damnosum*. However, many of the persons examined had been exposed to greatly increased biting risks outside the Kilembe valley by virtue of their occupations. As 22% of flies caught in the afternoon showed developing forms of nematodes, there seemed to be a definite risk of infection of the population.

298 people—all Europeans or Asians—were examined. They had been in the Kilembe area for 2 to 5 years. The tests made were differential blood counts and a provocative dose of diethylcarbamazine (4 × 50 mgm. tablets daily for 2 days in adults). It is recognized that this allergic reaction is non-specific as it may occur in infections with *Loa* and *Streptocerca* [this *Bulletin*, 1958, v. 55, 925], but neither of these occurs in the area and it was felt in any case that a negative result would be valuable.

None of the persons examined had any clinical evidence of onchocerciasis and all the allergic tests were negative. Only 9 had eosinophil counts above 10%; all were children with proved intestinal helminthiasis and their eosinophil count dropped to 4% or less after treatment.

The results suggest either that the incubation period may be very prolonged [as is in fact recognized in many cases] or that some other factor prevents development of overt disease despite repeated bites from infected flies.

It is added in a footnote that the investigation was repeated on 125 persons after a year and results again were all negative. *H. J. O'D. Burke-Gaffney*

HILL, G. **Methods of Water-Flow Measurement Applicable to *Simulium* Control.** *Bull. World Health Organization*. 1959, v. 21, No. 2, 201–5, 4 figs.

Simulium, the vector of onchocerciasis, frequently breeds in shallow, turbulent streams, sometimes with steep rocky beds. It is quite essential, therefore, in regulating the dose of insecticide used for the destruction of these insects, to know fairly accurately the rate of flow of water in the stream. In this paper the author, Malaria Engineer at the East African Institute of Malaria and Vector-Borne Diseases, reviews various methods of measuring river flows in the field. These include sharp-edged weirs, current meters, floats, the use of salt and Perrodil's hydradynamometer. He considers, however, that the most suitable method is the use of the Pitot tube. He describes a very simple instrument of this type and provides a calibration chart. He also discusses its use. [In this respect, since the paper is written for the non-engineer, it might have been useful to stress the fact that hydraulic velocity varies widely over the cross-section of flow—and to indicate where the mean flow in any vertical may be found approximately.] *Peter C. G. Isaac*

COHEN, G. **The Radiological Demonstration of** *Dracunculus medinensis*. *South African Med. J.* 1959, Dec. 26, v. 33, No. 52, 1094–5, 1 fig.

The author is a radiologist in Johannesburg, but the case here described was seen by him during a brief period when he was working at Dr. Albert SCHWEITZER's hospital in Lambarene.

A middle-aged African was subjected to X-ray examination because he had "hurt" his wrist. The radiographs showed multiple linear, oval and serpiginous opacities in the soft tissues of the forearm, wrist and hand, varying from 1 to 40 mm. in length and 0·1 to 1·0 mm. in width. The X-ray photograph and a schematic representation of it are presented, and the appearance of slender coiled worms is very striking. A diagnosis of *Dracunculus medinensis* infection was made. From the size and shape, some of the opacities were interpreted as representing dead male parasites.

The condition had not been recognized in the area before, but investigation of filed radiographs indicated that it had been demonstrated (but misinterpreted as artefacts) in a number of cases.

This case is believed to be the first radiological demonstration of the male *D. medinensis*, and furthermore it was found in an area of the body in which it was thought not to have existed. It is also said to be the first reported case of this infection from the West Coast of Africa south of the Equator.

A short introductory account of the guineaworm is given.

H. J. O'D. Burke-Gaffney

COCHRANE, J. C. & SKINSTAD, E. E. *Capillaria hepatica* **in Man—Follow-Up of a Case.** *South African Med. J.* 1960, Jan. 9, v. 34, No. 2, 21–2, 2 figs.

In the report of a case of *Capillaria hepatica* infection previously described by the senior author and his colleagues [this *Bulletin*, 1957, v. 54, 1446] it was stated that the child was very well 10 months after antimony treatment. The authors now report a follow up study after 3½ years. The liver was normal macroscopically and biopsy showed minimal portal fibrosis and no ova. The microscopic picture of the biopsy in February 1959 is reproduced together with that made in July 1956 and the change is very striking.

Liver function tests in 1959 had returned to normal, gamma globulin was reduced from 4·4 gm.% to 0·9 gm.% and eosinophilia from 78% to 4%. This is the only survival reported among the 5 cases recorded and it would seem that antimony treatment had been successful. The child is now nearly 5 years old and appears to be normal in every way.

H. J. O'D. Burke-Gaffney

ZOŁNIERKOWA, Danuta. Epidemiologiczne opracowanie ogniska włośnicy w pow. Kłodzko w r. 1959. [**Epidemiological Investigations on the Focus of Trichinellosis in the Klodzko District, in 1959**] *Wiadomości Parazytologiczne*. Warsaw. 1959, v. 5, No. 6, 577–83, 2 figs. English summary.

There were 378 cases. The source was raw sausage.

DEFICIENCY DISEASES

MURAI, Mary, PEN, Florence & MILLER, C. D. **Some Tropical South Pacific Island Foods: Description, History, Use, Composition, and Nutritive Value.** pp. xii + 159, 32 figs. & 1 map. [69 refs.] 1958. Honolulu: University of Hawaii Press, Hawaii.

NEILSON, J. McE. **Megaloblastic Anaemia in Scurvy. Report of a Case.** *Scottish Med. J.* Glasgow. 1960, Jan., v. 5, No. 1, 42–4, 3 figs. [12 refs.]

ARETAS, R. E. A propos des hypertrophies parotidiennes dites nutritionnelles. [**Concerning the So-Called Nutritional Hypertrophy of the Parotid Glands**] *Bull. Soc. Path. Exot.* 1959, May–June, v. 52, No. 3, 404–11. [12 refs.]

RAOULT and his colleagues [this *Bulletin*, 1957, v. 54, 1454] published an important paper describing the parotid enlargements commonly seen in French West Africa and came to the conclusion that the condition was nutritional in origin. The evidence for this view was most convincingly presented. The present author, working in the same area as Raoult, disagrees with this hypothesis. He found that in 33 patients with parotid hypertrophy the level of serum albumin was a little higher than in a control series: he could find no correlation between enlargement of the liver and of the parotid glands: there was no difference between the serum diastase levels of two groups of children, one with and one without parotid enlargement. He also presents epidemiological evidence that the condition is not associated with periods of food scarcity. All these findings are inconsistent with the view that the condition is nutritional in origin.

[When two writers of obvious competence disagree, the truth probably lies in a *via media*. After reading Raoult's paper, it is hard to believe that a deficient diet cannot give rise in certain circumstances to parotid enlargement, but Aretas's evidence certainly shows that a similar enlargement can arise when there is no evidence of malnutrition. As he suggests, infections, perhaps of viral origin, may be responsible in these cases. Clearly workers in the tropics presented with numbers of children with parotid enlargements should *suspect* malnutrition to be the cause but must be prepared to consider other possibilities.] *R. Passmore*

SMITH, R. & WATERLOW, J. C. **Total Exchangeable Potassium in Infantile Malnutrition.** *Lancet*. 1960, Jan. 16, 147–9, 2 figs. [19 refs.]

In infants with severe chronic malnutrition the total exchangeable potassium, as measured by an isotope dilution method, was reduced by 25–30%. This reduction was correlated with a reduced content of potassium in muscle obtained by biopsy. There was also an inability to produce an acid urine in response to a dose of ammonium chloride. It is pointed out that the level of potassium in serum is no guide to the level of the remaining reserves. In treatment it is necessary to give potassium supplements for at least 10 days.

The dose recommended is 20 mEq. per day (as potassium acetate), in addition to the potassium in the diet.

[See also this *Bulletin*, 1957, v. 54, 1451 ; 1958, v. 55, 563.]

R. Passmore

WATERLOW, J. **Effect of Protein Depletion on the Distribution of Protein Synthesis.** [Correspondence.] *Nature*. 1959, Dec. 12, v. 184, Suppl. No. 24, 1875–6, 1 fig.

If methionine labelled with ^{35}S is injected into rats, the label will be found in part in the carcass (including muscle and skin) and in part in the viscera (including the liver). During 7 days after injection the proportion in the viscera falls and in the carcass rises. In animals previously depleted of protein by a poor diet the proportion of the label found in the carcass was always less than in well-fed animals. Various possibilities are discussed which might account for this partial disability of the muscle and skin of malnourished rats to incorporate the amino-acid. *R. Passmore*

BENGOA, J. M., JELLIFFE, D. B. & PEREZ, C. **Some Indicators for a Broad Assessment of the Magnitude of Protein-Calorie Malnutrition in Young Children in Population Groups.** *Amer. J. Clin. Nutrition*. 1959, Nov.–Dec., v. 7, No. 6, 714–20. [25 refs.]

Any public health programme designed to reduce the incidence of protein malnutrition in children could only be efficiently administered if effective methods of assessment of the incidence of the condition are available. This paper discusses (1) vital statistics, (2) anthropometric measurements, (3) clinical signs, (4) food consumption and (5) laboratory tests. Each of these may be useful as an indication of the incidence of protein deficiency, under certain circumstances, but there is as yet no set of criteria based on easily obtainable data, which could provide a simple index of need. A number of possibilities are briefly reviewed each of which might be very useful in a particular circumstance. The authors write from a wide experience and the paper can be recommended to public health workers in areas where protein malnutrition is endemic. *R. Passmore*

BAGCHI, K., HALDER, K. & CHOWDHURY, S. R. **Study of Bitot's Spot with special reference to Protein Malnutrition.** *J. Indian Med. Ass.* 1959, Nov. 16, v. 33, No. 10, 401–7. [28 refs.]

A group of 46 young children with Bitôt's spots was studied. In 40 of these there was evidence suggesting probable deficiency of protein. In those children treated with vitamin A alone, the Bitôt's spot responded slowly (24–28 weeks), but if in addition to the vitamin, skimmed milk was given daily, regression of the spots was usually rapid (5–6 weeks). Before treatment there were low levels of plasma vitamin A and plasma albumin (which were significantly correlated, + 0·505). Both levels rose with treatment. The authors conclude that protein deficiency plays a significant role in the causation of Bitôt's spots.

R. Passmore

JELLIFFE, D. B. & DEAN, R. F. A. **Protein-Calorie Malnutrition in Early Childhood (Practical Notes).** *J. Trop. Pediatrics.* London. 1959, Dec., v. 5, No. 3, 96–106, 2 figs.

This paper lists, in summary form, the principal features of kwashiorkor as seen in Uganda, and the methods of treatment. It is clear, concise and dogmatic teaching, but contains nothing new. *R. Passmore*

BAPTIST, N. G., DE SILVA, C. C. & SIDEEK, M. A. **Electrophoretic Pattern of Plasma Proteins in Clinically Diagnosed Cases of Kwashiorkor (Protein Malnutrition) and Undernutrition (Marasmus) among Ceylonese Children.** *Brit. J. Nutrition.* 1959, v. 13, No. 4, 488–500. [21 refs.]

In children suffering from kwashiorkor and from undernutrition there was a rapid increase in plasma albumin and total protein after treatment with high protein diets. No marked differences between the protein levels in the two groups were observed. Before treatment the level of alpha globulins was lower in the undernutrition group than in the kwashiorkor group: after treatment the values tended to fall in the kwashiorkor group, but to rise in the undernutrition group. *R. Passmore*

SMYTHE, P. M. & CAMPBELL, J. A. H. **The Significance of the Bacteraemia of Kwashiorkor.** [Abstract.] *South African Med. J.* 1959, Sept. 12, v. 33, No. 37, 777.

Blood cultures were carried out on admission to hospital on 78 children suffering from kwashiorkor. Of these, 25 subsequently died and post-mortem blood cultures were done within an hour of death.

A significantly greater proportion of positive admission blood cultures was found in those who subsequently died than in those who survived. As intestinal bacteria were the commonest organisms isolated, the authors suggest that this may indicate both some breakdown in the intestinal barrier preventing bacterial invasion and also some disturbance in the normal immune mechanism of the blood such as properdin deficiency. *C. A. C. Ross*

THERON, J. J., COETZEE, V. & PRETORIUS, P. J. **A Histochemical Investigation of the Leucocytes in Kwashiorkor.** *J. Clin. Path.* 1959, Sept., v. 12, No. 5, 454–8, 5 figs. [15 refs.]

Histochemical tests were carried out on the leucocytes in blood smears from 10 healthy Bantu children in South Africa, and 8 adult white persons, as well as from 20 Bantu infants suffering from kwashiorkor. In the patients tests were carried out at the beginning of treatment and at weekly intervals thereafter. The white cells were examined for lipids, ribonucleic acid (RNA), deoxyribonucleic acid (DNA), glycogen, mucoproteins, peroxidase, and alkaline phosphatase. The fat content of the granulocytes was, on the average, constant over the period of 5 weeks in all patients, with a lower value for the second

week, and a slight subsequent decline. This average, however, was arrived at by combining two groups, one with a high lipid on admission and a subsequent fall, the other with a low lipid and a subsequent rise. The peroxidase and lipid values were more or less inversely related. The alkaline phosphatase activity was found to be fairly high at the beginning of treatment, to fall during treatment, and to rise again during the fifth week.

The authors discuss what is known at present of the relation between serum alkaline phosphatase activity and alkaline phosphatase content of the white cells. As the literature is, at the moment, contradictory, the authors feel that before results in kwashiorkor can be evaluated, further studies would have to be undertaken. No differences between normal subjects and patients could be seen in respect of glycogen, mucoproteins, and nucleic acids. *H. Lehmann*

WELBOURN, H. F. **Backgrounds and Follow-up of Children with Kwashiorkor.** *J. Trop. Pediatrics.* London. 1959, Dec., v. 5, No. 3, 84–95, 1 fig. [13 refs.]

This paper discourses at length on the background and clinical features of 65 children with kwashiorkor, who attended at a child welfare clinic in Uganda. Many of them responded well and those in whom a follow-up was possible grew well and had no relapse. *R. Passmore*

SPRUE

GREEN, P. A., WOLLAEGER, E. E., SCUDAMORE, H. H. & POWER, M. H. **Non-tropical Sprue. Functional Efficiency of Small Intestine after Prolonged Use of Gluten-Free Diet.** *J. Amer. Med. Ass.* 1959, Dec. 19, v. 171, No. 16, 2157–62. [18 refs.]

10 patients with histories of idiopathic steatorrhoea of at least 5 years' duration had been on diets free from wheat and rye gluten for more than a year (up to 3¾ years) in 9 cases and over 6 months in one. They had been placed on this diet after failure of standard methods of treatment. Some were getting additional vitamin supplements. They all appeared to be clinically well on the diet, although 2 still had bulky stools, 5 had abdominal discomfort or had noted looseness of stools unless dietary fat was restricted.

Over the period of study they were placed on a gluten-free diet containing 113 gm. fat, 123 gm. protein, and a total calorie content of 2,650. Fat absorption was determined in 6-day samples of faeces. Vitamin A and glucose oral absorption curves were obtained. All had barium meals; total and differential serum protein and the electrolyte, serum phosphatase, etc., were determined.

On the basis of normal upper limits of 7·5 gm. of fat in 24 hours, or 30% of the total faecal solids as fat, all patients had steatorrhoea. Other evidence of intestinal malabsorption was also found.

The authors conclude: "The finding of persistent malabsorption after long

periods of successful gluten-free dietotherapy serves to emphasize two points, namely, (1) the possibility remains that intolerance to gluten is not the ultimate cause of nontropical sprue and (2) states of nutritional deficiency theoretically may develop unless supplemental doses of vitamins and minerals are included in the gluten-free dietary program". *B. G. Maegraith*

HAEMATOLOGY

WADSWORTH, G. R. & LEE, T. S. **Haemoglobin Levels of Schoolchildren in a Rural Health District of Malaya, and of Pregnant Women in Malaya and Singapore.** *J. Trop. Pediatrics.* London. 1959, Dec., v. 5, No. 3, 67–72, 3 figs. [23 refs.]

The presence of anaemia in Malay and Chinese schoolchildren is confirmed, and its extent defined, by a survey of 435 children in 6 schools [this *Bulletin*, 1959, v. 56, 1048]. Spot diagrams show no girls with a Hb level (on the Haldane scale) below 70%, and no boys with a Hb below 65%. The mean Hb at age 7 was for boys 78·9% and for girls 80·3%; these mean values rose at age 12 to 84·1% for boys and 85·7% for girls.

In a group of 184 pregnant women examined, 30% were found to be anaemic, but only 7% showed an MCHC of less than 30·7%. In another group of 24 investigated for anaemia of pregnancy, the predominance of hypochromic anaemia was confirmed. *Alan B. Raper*

SILHAR, A. S. & MARU, A. M. **Intramuscular Iron in Anaemia of Infancy and Childhood.** *Indian J. Child Health.* 1959, Dec., v. 8, No. 12, 611–14.

The efficacy of the iron-dextran complex, Imferon, was assessed in 40 children with hypochromic anaemia in Rajkot (western India). Dosage was calculated from the haemoglobin deficit in each child, and was given in 6 intramuscular injections, on alternate days. Results are given only as averages for the whole group; the Hb level rose from an average of 46% to 71% after 4 weeks. The estimated average utilization of iron was 6·8%, or 0·99 gm. of Hb for every 100 mgm. of iron injected. *Alan B. Raper*

See also p. 495, SAIF, **On Some Haematological Aspects of Ancylostomiasis.**

GILLES, H. M., WATSON-WILLIAMS. J. & TAYLOR, B. G. **Glucose-6-Phosphate Dehydrogenase Deficiency Trait in Nigeria.** [Correspondence.] *Nature.* 1960, Jan. 23, v. 185, 257–8.

10% of American Negroes are deficient in glucose-6-phosphate dehydrogenase (*Blood*, 1959, v. 14, 103) and furthermore haemolytic anaemia caused by primaquine and some other drugs occurs only when this sex-linked inherited deficiency of red cell glucose-6-phosphate dehydrogenase is present (*Science*,

1956, v. 124, 484). The authors, therefore, examined 204 male Africans in Nigeria: 139 were Ibo from a leprosarium and 65 were Yoruba attending University College Hospital in Ibadan. A rapid screening test indicated that 20 persons were deficient in glucose-6-phosphate dehydrogenase and assay for this enzyme was carried out on them and on 18 normal persons. 9 Ibo and 11 Yoruba showed the deficiency trait.

Motulsky and Campbell (*Blood*, in press) suggested that persons lacking this enzyme may have a relative resistance to *Plasmodium falciparum* malaria; this could be investigated by field studies of children under 5 years old and by study of severely ill children in hospital with malaria. The presence of the trait may determine the onset of haemolytic anaemia induced by DDS in Nigerian patients with leprosy; this is estimated to have an incidence of about 10%. Evidently the tribal incidence of the trait will require assessment in a larger unselected group and it should be looked for in unexplained haemolytic anaemia in adult Nigerians which is " often summarily dismissed as ' blackwater fever ' ".

H. J. O'D. Burke-Gaffney

Silvestroni, E. & Bianco, I. Nuovi dati sulla frequenza della microcitemia e delle malattie microcitemiche nella provincia di Lecce. [**New Data on the Frequency of Microcythaemia and of Microcythaemic Diseases in the Province of Lecce**] *Nuovi Ann. d'Igiene e Microbiol.* 1959, July–Aug., v. 10, No. 4, 335–41, 2 figs. [13 refs.] English summary.

In 1947 Bianco carried out a preliminary survey (*Minerva Med.*, 1948, v. 1, 232) in the towns of Lecce, Galatone and Gallipoli (province of Lecce in the region of Apulia). He examined 626 persons and found microcythaemia in 5·3% as well as several cases of Cooley's anaemia.

In the summer of 1959, Silvestroni and Bianco carried out a more extensive survey in Lecce province. In a first stage they examined a total of 1,969 children from 15 summer camps and 4 children's homes, who came from all parts of the province. In response to a request from their local authorities, 1,717 married couples, from various towns, volunteered to have their own blood tested. In this representative total of 3,686 subjects, including children and adults, 293 or 7·94% had a microcythaemia. The incidence rate was as high as 11·3% in the district of Salice and 10·6% in Muro. Lecce itself, which is the provincial centre, and Gallipoli, seaport town, showed incidence rates of 5% and 5·8% respectively: their population is believed to include a high proportion of immigrants.

Enquiries were made, through local health authorities, for known cases of Cooley's anaemia and of other chronic anaemias in children with splenomegaly: 23 out of 28 towns produced a total of 60 cases. In 25 families there were 30 members with Cooley's anaemia and 5 others with a serious microcytic anaemia. Each of 17 families had lost one or more sons—29 in all—from Cooley's anaemia. Family histories pointed to the homozygotic pattern in the parents of those with Cooley's anaemia and the heterozygotic in cases of constitutional microcytic anaemia.

At an average of 7·94%, the incidence rates which emerged from this survey are high and call for public health measures to control the condition.

J. Cauchi

MARTI, H. R. & BETKE, K. Das Vorkommen der Thalassämie in der deutschen Schweiz. Untersuchungen einer Sippe. [**The Occurrence of Thalassaemia in German-Speaking Switzerland**] *Schweiz. med. Woch.* 1959, Oct. 10, v. 89, No. 41, 1079–81, 2 figs. [11 refs.]

A Swiss family in which thalassaemia minor occurred in 7 persons is described. In 3 instances of what the authors call thalassaemia minima, the mean corpuscular volume (MCV) of the red cells was normal, and in 2 of them the haemoglobin A_2 level was also normal, although foetal haemoglobin was present.

The family investigation was made after the propositus, a 23-year-old female, had been noted to have a hypochromic anaemia which did not respond to oral and parenteral iron therapy. The trait could be traced to the mother and to the mother's maternal uncle, the mother's mother having died. This family was known to have ancestors of Italian origin. The authors point out that there is much southern influence in the German-speaking Swiss, and that one has to assume that heterozygous thalassaemia occurs more often than would be normally anticipated. *H. Lehmann*

MUKHERJEE, A. M., SEN GUPTA, P. C. & CHATTERJEA, J. B. **The Spleen in Thalassaemia.** *J. Indian Med. Ass.* 1959, Dec. 1, v. 33, No. 11, 451–9, 5 figs. on pl. [15 refs.]

This paper is of interest because it comes from the group in Calcutta who are studying thalassaemic syndromes, and because 29 of the 30 spleens described were operation specimens, though it is in fact a study of Hb E—thalassaemia since this was the diagnosis in 24 of the patients, only the remaining 6 being regarded as homozygous thalassaemics. The latter group naturally contained the youngest patients, but the findings were similar for all.

Features of the splenic pathology are set out in a synoptic table, and are illustrated by photomicrographs. They are summarized as follows:—

"The weight of the spleen was increased to the extent of 4 to 7 times the normal. The splenic capsule was frequently thickened and the trabeculae prominent. The degree of splenomegaly usually determined the changes in the supporting structures, viz., the capsule, the trabeculae, and the reticulum.

"There was attenuation of the lymphoid follicle in the majority of the cases.

"Splenomegaly was essentially due to (*a*) congestion of the greatly increased and dilated vascular bed in the organ, (*b*) hyperplasia of the reticuloendothelial cells and (*c*) extramedullary haemopoiesis. In the majority of cases there were many foci of haemopoietic tissue in the red pulp."

Mild diffuse haemosiderosis was noted in 16 spleens, and ascribed to blood transfusions; 7 spleens however showed haemosiderotic nodules. There is special mention of the presence, in all but 3 of the spleens, of large or small groups of cells with a pale eosinophilic foamy cytoplasm. These cells averaged $18{\cdot}5 \times 13{\cdot}1\mu$ in size, and their cytoplasm was rich in PAS-positive material. The authors have not seen them in other splenomegalic conditions. [The abstracter has however seen them in some "tropical splenomegalies" in Africa, not thought to be thalassaemic, but like the present authors is unable to give an explanation for their presence or functions.] *Alan B. Raper*

RAMOTH, B., SHEBA, C. & FISHER, S. **[Thalassaemia, Hemoglobin H Disease and Persistent Bart's Hemoglobin in a Jewish Family from Iraq]** *Harefuah*. Jerusalem. 1960, Jan. 1, v. 58, No. 1 [in Hebrew 1–2, 4 figs. (16 refs.) English summary 3.]

See this *Bulletin*, 1960, v. 57, 284.

TRINCÃO, C., DE ALMEIDA FRANCO, L. T. & NOGUEIRA, A. R. **A Survey of Abnormal Haemoglobins in Portuguese Guinea.** [Correspondence.] *Nature*. 1960, Jan. 30, v. 185, 326–7.

In their survey of 9,224 blood samples in Portuguese Guinea for abnormal haemoglobins [this *Bulletin*, 1959, v. 56, 561] the authors have found a number of types, which are listed for 26 tribes. They note that initially positive sickling tests frequently could not be confirmed on paper electrophoresis and duplicate tests thereafter showed negative sickling reactions; they do not therefore consider the sickling test alone to be reliable for determining sickling rates.

In the present study, Hb S was found in 699 cases (7·5%) and varied greatly in incidence among different tribes (from 0·2% to 23·6%); it was commoner among Moslems than among Fetichists.

Hb C was seen in 21 cases, only among Moslems (who have closer relationships with neighbouring countries). Hb K [*ibid*., 1957, v. 54, 1118] is rare but it was found in this survey 8 times—6 in Moslems and 2 in Fetichists.

Hb N was found in 14 cases [*ibid*., 1959, v. 56, 561]. It is apparently very rare and the authors state that they were informed by Dr. LEHMANN that it was not revealed in a recent survey of 2,000 Nigerians. *H. J. O'D. Burke-Gaffney*

ALLISON, A. C., CECIL, R. & SNOW, N. S. **The SH-Group Content of Human Foetal and Sickle-Cell Haemoglobins.** *Biochem. J.* 1960, Feb., v. 74, No. 2, 273–6. [27 refs.]

"1. The SH-group contents of human foetal and sickle-cell haemoglobins have been determined by amperometric titration with phenyl mercuric hydroxide.

"2. Some variation was found in the SH-group content of different samples of foetal haemoglobin. The mean values from six samples was 2·0 SH groups per mole in the native protein and 4·2 SH groups per mole in the denatured protein. Possible reasons for this variation are discussed.

"3. Sickle-cell haemoglobin was found to have the same SH-group content as normal human adult haemoglobin, namely 2·2 SH groups per mole in the native protein and 6·0 SH groups per mole in the denatured protein."

HILKOVITZ, G. **Sickle-Cell Disease. The "Aplastic Crisis" and Erythroid Maturation Defect occurring Simultaneously in Three Members of a Family.** *Arch. Intern. Med.* 1960, Jan., v. 105, No. 1, 76–82, 7 figs. [18 refs.]

[See this *Bulletin*, 1957, v. 54, 1232.]

JENKINS, M. E., SCOTT, R. B. & BAIRD, R. L. **Studies in Sickle Cell Anemia. XVI. Sudden Death during Sickle Cell Anemia Crises in Young Children.** *J. Pediatrics.* St. Louis. 1960, Jan., v. 56, No. 1, 30–38, 5 figs. [19 refs.]

The authors feel that it is timely to re-emphasize the vulnerability of the very young child with sickle-cell anaemia to severe crises leading to early death; and they illustrate the point by brief descriptions of 10 such fatalities seen in a 10-year period. Common to all were extreme pallor, weakness and lethargy, tachycardia, and cold clammy skin. Death followed apnoea in 4 children, and convulsions or coma in 3, and it always occurred within an hour or two of the onset of the crisis. Autopsies were made on 7 of the children and, as usual, widespread capillary sickling of the red cells was found. This feature was present in the brain in the only case in which that organ was examined. The prominent clinical signs of shock were accompanied in some cases by engorgement of an already enlarged spleen. No serious infections were discovered; anaemia was always profound, but the marrow, where examined, usually active. The cause and the exact nature of this kind of crisis remain unexplained.

[For earlier studies in this series, see this *Bulletin*, 1959, v. 56, 972.]

Alan B. Raper

HENDRICKSE, R. G. & COLLARD, P. **Salmonella Osteitis in Nigerian Children.** *Lancet.* 1960, Jan. 9, 80–82, 3 figs. [19 refs.]

Children suffering from sickle-cell anaemia are known to be peculiarly susceptible to salmonella osteitis [this *Bulletin*, 1956, v. 53, 1044; 1958, v. 55, 89, 570]. This paper reports 13 examples of salmonella osteitis investigated in the children's department of University College Hospital, Ibadan, Nigeria. 7 of the affected children were proved to be suffering from sickle-cell anaemia, one was a non-sickler and in 5 the necessary tests for a haemoglobinopathy were not performed. In one of the last group, an 8-day-old infant, the possibility of sickling being a predisposing factor could be ruled out, since even in the homozygous condition sickling is of negligible degree at this early age.

In the patients known to have sickle-cell anaemia the osteitis showed remarkable bilateral symmetry; this was not evident in the non-sickler, while only 1 of the patients whose haemoglobin type was unknown showed symmetrical osteitis. A wide range of salmonella types was isolated from the faeces or pus, including a new species, named *Salm. ank*: in several instances antibodies to one or more additional types were demonstrated in the blood.

Since among this series of 13 examples of salmonella osteitis 7 were proved cases of sickle-cell anaemia, the authors have little doubt that the association of these two conditions is significant. [In the population of Ibadan the incidence of the sickle-cell trait is 25%, which implies that on an average 1 marriage in 16 will be between carriers of this trait, and about 1 child of every 4 born of such a union will be a homozygous carrier of the sickle gene: on an average, therefore, in such a population, 1 infant in every 64 will be thus lethally endowed.]

In 5 patients diarrhoea certainly preceded the onset of osteitis and in 2 of them identical organisms were isolated from both faeces and pus. 9 of the 13

patients were below 2 years of age, and the special susceptibility of this age-group is probably related to the high incidence of acute gastro-enteritis which obtains in it, while the subsequent dying off of many of the children showing homozygous sickle-cell disease decreases the proportion of sickle-cell anaemia patients in the older groups.

The authors note that among the sickle-cell anaemia patients the distribution of osteitis corresponded to the most frequent sites of bone infarction and conclude that organisms of transient passage in the blood stream are particularly likely to flourish in such devitalized tissues. Capillary occlusion due to intravascular sickling, by lowering the vitality of the alimentary mucosa, may facilitate the development of salmonella enteritis, and blood-borne organisms may long remain latent in the bone marrow until its infarction favours their multiplication. Autosplenectomy [from repeated splenic infarction] is unlikely to play a contributory role since it has scarcely had time to develop in the first 2 years of the life of a child suffering from sickle-cell anaemia.

J. H. Walters

SCHNEIDER, Rose G. & HAGGARD, Mary E. **A Family with Hemoglobin G.** *J. Lab. & Clin. Med.* 1960, Jan., v. 55, No. 1, 60–66, 3 figs. [18 refs.]

An account of the variant in a Negro woman and her 5 children in Texas.

GILLESPIE, J. E. O'N., WHITE, J. C., ELLIS, M. J., BEAVEN, G. H., GRATZER, W. B., SHOOTER, E. M. & PARKHOUSE, R. M. E. **A Haemoglobin with Unusual Alkaline-Denaturation Properties in a Turkish-Cypriot Woman.** [Correspondence.] *Nature*. 1959, Dec. 12, v. 184, Suppl. No. 24, 1876–7, 1 fig.

An unusual haemoglobin component was found in the red cells of a Cypriot woman who also had thalassaemia minor. The new component, amounting to 40% of the total Hb, migrated on paper at *p*H 8·6 in the region of Hb G, L, and Q; but these variants were excluded because on resin chromatography there was no resolution of the new component from Hb A. The only variant that would behave in the foregoing manner is "Galveston" (*Nature*, 1957, v. 180, 1486). But it was found that the new component was denatured by N/25 alkali at a rate less than that for Hb A, but greater than that for Hb F (half-reaction time about 100 sec.). The ¾-min. alkaline denaturation residue was high (15%), but it contained no detectable Hb F, and the tryptophan fine-structure band of the total haemolysate was identical with that of Hb A.

This variant, provisionally designated "Cyprus I", is thus distinct from Hb F, but more resistant to alkali denaturation than is adult haemoglobin. Its relation to disease is undetermined; it was not present in the 8-year-old child of the carrier, though the former suffered from moderately severe thalassaemia with 60% of Hb F.

Alan B. Raper

VENOMS AND ANTIVENENES

LAMY, R., ROGER, F. & ROGER, A. Le titrage des sérums antivenimeux. I. L'effet cytotoxique des venins de vipère (*V. aspis*) pour les cellules de souche KB. Sa neutralisation par les sérums antivenimeux homologues. **[Titration of Anti-Venom Sera. I. Cytotoxic Effect of *Vipera aspis* Venom on KB Cells. Its Neutralization by Homologous Anti-Venom Sera]** *Ann. Inst. Pasteur.* 1960, Feb., v. 98, No. 2, 309–13.

MAENO, H., MITSUHASHI, S., SAWAI, Y. & OKONOGI, T. **Studies on *Habu* Snake Venom. 2. Enzymic Studies on the Proteinase of *Habu* Snake Venom.** *Japanese J. Microbiol.* 1959, Apr., v. 3, No. 2, 131–8, 6 figs. [18 refs.]

CARRUTHERS, R. H. **Surgical Treatment of the Late Complications of Snake Bite.** *West Indian Med. J.* 1959, June, v. 8, No. 2, 87–91, 4 figs. on 2 pls.

Snake bite is a condition of comparative frequency in many parts of the world, and the mortality is not negligible. In British Guiana the mortality is probably under 5% and most bites come from the pit-vipers whose venoms possess powerful proteolytic, haemorrhagic and haemolytic properties which may cause extensive tissue destruction. They also appear to be anti-bactericidal.

Whereas much attention has been given to the emergency treatment of snake bite (prolonged immersion of the limb in ice-cold water is advocated) [this *Bulletin*, 1957, v. 54, 1119], relatively little attention appears to have been given to the treatment of the late complications of the injury. The extent of morbidity following snake bite is perhaps not sufficiently appreciated. The great majority of bites are in the limbs and of 22 subjects admitted to the MacKenzie Hospital, British Guiana, between 1955 and 1958, 15 had been bitten on the lower and 6 on the upper limbs. The lower limb is particularly vulnerable to the late effects of snake bite in the form of permanent disability.

Tissue necrosis is frequently both wider and deeper after snake bite than appears at first sight. Muscles, bone, joints and tendons may all be involved in deep thrombosis and severe local and systemic infection may accompany the gangrene. It is usually at least 10 to 14 days before the full extent of the damage is evident. Tissue regeneration may be very slow.

Emergency treatment is not discussed. The limb should be elevated and well padded around a non-adherent dressing such as gauze impregnated with polyethylene glycols. Anti-tetanus and anti-gas-gangrene serum should be given, together with antibiotic and full vitamin therapy. Abscesses are to be opened as they form and heavily infected wounds do well on eusol irrigation. The definitive slough should be excised under anaesthesia (usually 2–3 weeks after) and exposed tendons and nerves carefully preserved unless amputation is obviously necessary. When clean (slight infection is no bar) the wound should be skin grafted as soon as possible and any loss of more than one inch in diameter is worth grafting. In any case grafts are better not larger than this when being applied. After grafting healing is usually rapid. Any tendon transplants should be delayed for at least 3 months. According to the areas involved, the skin grafts may be split skin, full skin or pedicle in type.

Two illustrative case histories are given. *J. R. Rose*

ADAM, K. R. & WEISS, C. **Scorpion Venom.** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Nov., v. 10, No. 3, 334–9, 2 figs. [29 refs.]

The venom of the common Egyptian and Sudanese scorpion *Leiurus quinquestriatus* has on intramuscular injection an LD50 for mice of 6·5 mgm. per kgm. body weight. Its toxicity is thus comparable to that of many snake venoms.

The authors suggest that in view of the fact that the venom can be obtained easily by electrical stimulation of the telson, its pharmacological properties should be more carefully studied, rather than its complicated action in the intact animal.

Electrophoresis and chromatography of the crude venom revealed a relatively high content of 5-hydroxytryptamine, the presence of which was confirmed by other methods. Section of the venom glands showed the enterochromaffin structures which appear to be associated with the presence of this substance, the toxic significance of which is uncertain.

Crude venom caused slow contraction and increased response to electrical stimulation of frog sartorius and rat diaphragm even in the presence of curare. After long exposure the responses to stimulation were reduced. Calcium salts could prevent these reactions.

Electrophoresis revealed two distinct bands. Eluates from the slower band had muscular effects similar to those of the crude venom. They also elicited contractures of innervated frog gastrocnemius when applied to the desheathed peripheral nerve. The activity was destroyed by heat or incubation with trypsin, suggesting that the active substance was a protein.

The authors conclude that scorpion venom contains several active substances. The poisonous activity seems to be independent of the presence of 5-hydroxytryptamine. *B. G. Maegraith*

WIENER, S. **The Sydney Funnel-Web Spider (*Atrax robustus*): II. Venom Yield and other Characteristics of Spider in Captivity.** *Med. J. Australia.* 1959, Nov. 7, v. 2, No. 19, 678–82, 3 figs.

Over a period of 3 years the author has examined over 3,000 specimens of *Atrax robustus* [this *Bulletin*, 1958, v. 55, 315] collected in the Sydney area. Females outnumbered males in this series by 11 to 1. Immature males were sometimes confused with females and had to be distinguished by dissection of the sex organs. The mature female yielded 2½ times the volume of venom produced by the male, but the venom of the latter was more active. Immature spiders produced small quantities of relatively less toxic venom. The amount of venom produced by a spider was roughly proportional to its length (blunt end of chelicerae to end of abdomen).

Many interesting observations were made regarding the habits of the captive spiders. No mating occurred in capitivity. Females were able to kill males, and both sexes fought vigorously and sometimes successfully with centipedes which nevertheless sometimes killed the spiders.

2 further human deaths from *Atrax* bites are described, making the total number of authenticated deaths 7. Of these 4 are known to have been caused

by bites of male spiders. If the ratio of 11 to 1 indicates a natural predominance of females over males, the male is relatively rare. Nevertheless it must be regarded as the greatest menace. Prognosis in bites from females is good, in bites from males it appears to be bad. *B. G. Maegraith*

SAUNDERS, P. R. & LIFTON, S. E. **Sting by a Venomous Lionfish.** *U.S. Armed Forces Med. J.* 1960, Feb., v. 11, No. 2, 224–7, 1 fig.

"A case of severe poisoning following a sting by dorsal spines of the tropical marine lionfish (*Pterois volitans*) is reported. The victim experienced severe local pain and swelling, followed by cardiovascular collapse. Repeated administration of epinephrine was effective in restoring and maintaining blood pressure and heart rate. Local swelling persisted for a period of weeks after the sting, but no permanent after-effects were noted."

TOXOPLASMOSIS

KULASIRI, C. & DASGUPTA, B. **A Cytochemical Investigation of the Sabin-Feldman Phenomenon in *Toxoplasma gondii* and an Explanation of its Mechanism on this Basis.** *Parasitology*. 1959, Nov., v. 49, Nos. 3/4, 586–93. [19 refs.]

The cytoplasm of *Toxoplasma gondii* normally contains cytochemically demonstrable ribonucleic acid. After the action of cytoplasm-modifying antibodies in the Sabin-Feldman dye test this ribonucleic acid is either removed or becomes no longer demonstrable. The same effect could be produced in some conditions by the use of ribonuclease, and the authors of this paper suggest that the mechanism of the dye test is bound up with the alteration or disappearance of ribonucleic acid. *I. A. B. Cathie*

THALHAMMER, O. Die Diagnose und Behandlung einer Toxoplasmainfektion in der Gravidität. Geburt eines gesunden Kindes bei einer mit Sulfonamid-Pyrimethamin behandelten Lymphknoten-Toxoplasmose im vierten und fünften Schwangerschaftsmonat. [**Diagnosis and Treatment of Toxoplasmosis during Pregnancy: Report of a Case**] *Deut. med. Woch.* 1960, Jan. 29, v. 85, No. 5, 177–9, 210.

The English summary appended to the paper is as follows:—

"The case is reported of a woman who fell ill with toxoplasmosis of the lymph nodes during the fourth month of pregnancy. Because the chances of intra-uterine infection were very great in these circumstances, she was given two courses of 4 weeks each of triple sulphonamides (1 Gm. 4 × daily for 14 days, then 1 Gm. 3 × daily for another 14 days) and pyrimethamine (initial

dose of 50 mg. followed by 25 mg. daily for 4 weeks). The child was born 5 weeks before the expected day of delivery, but there was no clinical or serological evidence of toxoplasmosis, and he has developed normally since (16 months). Various aspects of this case are discussed."

ZELLWEGER, H. U. Die kongenitale *Toxoplasma*-Enzephalitis und ihre Differentialdiagnose. [**Congenital *Toxoplasma* Encephalitis and its Differential Diagnosis**] *Deut. med. Woch.* 1960, Jan. 29, v. 85, No. 5, 173–7, 209–10. [64 refs.]

BEVERLEY, J. K. A. & WATSON, W. A. **Ovine Abortion due to Toxoplasmosis.** [Correspondence.] *Nature.* 1959, Dec. 26, v. 184, Suppl. No. 26, 2041. [11 refs.]

Abortion occurs in 3% of ewes in Yorkshire, and in half of these cases the aetiology is unknown. Accordingly, foetuses were examined for evidence of *Toxoplasma.* Infection of the organism was detected in 6 out of 39 (5 times in the brain and once in the liver). Dye tests were performed on the ewes of the same flocks: 66% of those lambing normally gave a positive reaction (including 5% in high titre); 72% of those aborting as a result of a bacterial or viral cause gave a positive reaction (including 6% in high titre); 82% of those aborting for other reasons gave a positive reaction (including 14% in high titre). So far it is not known if infected foetuses are produced in more than a single pregnancy. *P. C. C. Garnham*

DE ROEVER-BONNET, H. **Experimental Oral Infection of Animals with *Toxoplasma gondii*.** *Trop. & Geograph. Med.* Amsterdam. 1959, June, v. 11, No. 2, 162–6.

Toxoplasma gondii was administered by mouth either in the free form or as cysts (of the virulent Burk strain) to mice, white rats and rhesus monkeys. The infective material was mixed with the food in the form of a "mash" (of *p*H 7·0), which the animals consumed in the ordinary way. The animals were tested 6–8 weeks later for the development of toxoplasmosis by the dye test and by the recovery of the organism. The experiments with free forms were all negative; when cysts were used the mice usually became infected (but not the other animals, which may, however, have received non-viable material). The cysts of a virulent strain were given, and the subsequent infection in mice proved to be asymptomatic or non-fatal. *P. C. C. Garnham*

FERRARA, A., ORLANDELLA, V., SANTORO, E. & ANDRINI, F. **Visceral Injuries and Experimental Toxoplasmosis.** *Panminerva Med.* Turin. 1959, Dec., v. 1, No. 8, 357–64, 25 figs.

An abridged translation of a paper in Italian, this *Bulletin,* 1959, v. 56, 1274.

DEANE, Maria P. & NUSSENZWEIG, Ruth S. **Observations on the Diagnosis of Chronic *Toxoplasma* Infection in Mice.** *Rev. Inst. Med. Trop. São Paulo.* 1959, July–Aug., v. 1, No. 2, 119–28. [13 refs.]

Using a rabbit strain of *Toxoplasma gondii*, the authors infected white mice by various routes including the usual intraperitoneal inoculation of exudate, and *via* triatomid bugs and ticks. Most of the mice died in 4–5 days but in a few animals chronic infections developed and these were diagnosed in the following way. (1) The peritoneal fluid was examined directly for parasites or was injected into other animals. (2) The Sabin-Feldman dye test was performed between the 20th and 30th days and again after 45 or more days. At first it was concluded that if the organism could not be found and several dye tests were negative the animal was not infected; but when the brains of such animals were examined, cysts of *Toxoplasma* were often discovered. Among 69 mice which had survived 20 days or more, 4 gave a positive dye test reaction and 3 of these showed cysts in the brain; 58 gave a negative dye test and 40 of these showed cysts in the brain. The cysts [or " pseudocysts " as the authors call these structures] were usually unaccompanied by a cellular reaction, but occasionally invasion by cells had taken place.

A further series of mice were infected and were treated with sulphadiazine; those which survived for 15 days or more were tested by the dye test and were all found to be positive.

The authors conclude that if the inoculum is very small—as after arthropod transmission—insufficient cytoplasm-modifying antibodies are produced to give a reaction in the dye test, although cysts form in the brain; in fact they suggest no " proliferative " forms may develop at all, the organism going straight to cyst formation. [They consider and discard the possibility that another organism may have been mistaken for *Toxoplasma*; but no pictures or measurements are given, and in view of the rather extraordinary nature of these results it would have been desirable to have, at least, disproved completely the existence of, say, Encephalitozoon.] *P. C. C. Garnham*

DERMATOLOGY AND FUNGUS DISEASES

GOLDMAN, L., SAWYER, Faye, LEVINE, Ann, GOLDMAN, J., GOLDMAN, S. & SPINANGER, Joan. **Investigative Studies of Skin Irritations from Caterpillars.** *J. Investigative Dermat.* 1960, Jan., v. 34, No. 1, 67–78, 14 figs. [32 refs.] Discussion 78–9.

LACAZ, C. da S. Aspectos clínicos e epidemiológicos das micoses profundas na América do Sul. [**Clinical and Epidemiological Aspects of Deep Mycoses in South America**] *Rev. Inst. Med. Trop. São Paulo.* 1959, July–Aug., v. 1, No. 2, 150–64. [93 refs.] English summary.

The English summary appended to the paper is as follows:—

" The deep mycoses are frequent in South America. Exceptions are the

mycoses produced by fungi of the genus *Cercospora* and *Basidiobolus*, which up to this date, were not found in this continent. On the other hand, two deep mycoses are peculiar to the South American territory ; they are South American blastomycosis and keloid blastomycosis, or ' Jorge Lôbo blastomycosis '. This last kind of blastomycosis has a limited distribution and is found chiefly in persons who work in latex extraction in Amazonas and among Indians in the central part of Brazil.

" Doing the analysis of the epidemiological aspects of the deep mycoses in South America, the author describes briefly its regional geography, with the purpose of bringing out the great importance of South American blastomycosis—a deep mycosis produced by *Paracoccidioides brasiliensis*, which almost always has a serious course and which was found in almost all the South American countries.

" All the principal data concerning the history, geographical distribution, mycological aspects, sources of infection, anatomoclinical forms, differential diagnosis, laboratory diagnosis, anatomopathology, treatment and control of cure of this infection are presented.

" The keloid blastomycosis, or ' Lôbo's blastomycosis ', is considered a clinical entity different from South American blastomycosis and produced by a new species of *Paracoccidioides*, the *Paracoccidioides loboi*. In the conception of this new form of blastomycosis, anatomoclinical, histo-pathological, mycological and immunological data were taken into account.

" Concerning the North American blastomycosis the author believes that the majority of cases recorded were, as a matter of fact, cases of South American blastomycosis.

" Cryptococcosis is found in South American countries with the classical aspects.

" Chromomycosis is of common occurrence, mainly in Brazil, where many scientific papers and theses have been written about the matter. In the treatment of chromomycosis it is noteworthy the good results that BOPP obtained with the association of iodic medication to D_2 vitamin.

" Histoplasmosis has been studied very carefully as of late in various countries of South America, mainly after the demonstration by means of the histoplasmin test, that there are many reactors among the people. *Histoplasma capsulatum* has been isolated from the soil and from wild and domestic animals in South America, as well as in other countries of the world.

" Up to the present coccidioidomycosis has not been found in Brazil, and in the other countries of South America it does not represent an important epidemiological problem. Coccidioidomycosis has been referred in Venezuela and Argentina, but in very few instances.

" Rhinosporidiosis has been studied in Brazil mainly by THIAGO DE MELLO and most of the cases recorded were of the nasal form.

" Sporotrichosis is very frequent, mainly in Brazil, where about 0·5 percent of all the dermatoses have this etiology. The most varying clinical forms are frequent in patients attended to in a dermatological ' out-patient service '. The contribution of Brazilian researchers concerning the value of sporotrichin test in the diagnosis of sporotrichosis is important, and they have pointed out the great sensitiveness of the test (sporotrichin prepared with the yeast form of *Sporotrichum schencki*).

" Actinomycosis is more frequent than maduromycosis, and in the majority

of cases it is produced by *Actinomyces brasiliensis*, which was identified for the first time by Lindenberg (1909) in Brazil.

"The fungi *Monosporium apiospermum*, *Cephalosporium falciforme*, and *Madurella grisea* are the most frequently recovered from cases of maduromycosis."

[Many of the original papers on which this useful review is based have been abstracted in this *Bulletin* in past years, *e.g.* 1950, v. 47, 775, 777, 778, 1124; 1955, v. 52, 687; 1956, v. 53, 1383 etc.]

LEMOS MONTEIRO, E. & DE BRITO, T **Infection of the Chorio-Allantoic Membrane of the Chick with the Agent of Keloid Blastomycosis** (*Paracoccidioides loboi*). *J. Path. & Bact.* 1959, Oct., v. 78, No. 2, 567–9, 4 figs. on pl.

In an endeavour to culture the aetiological agent of keloid blastomycosis (*Paracoccidioides loboi*) which is difficult to culture on the usual laboratory media the authors injected it into embryonated eggs.

Histological findings included, in the ectoderm: ulceration with evidence of degenerative changes and epithelial proliferation at the ulcer's edge, necrosis of individual epithelial cells, some of which showed hydropic degeneration, and, in advanced stages, keratin granules and superficial cornification; in the mesoderm: oedema, congestion and granulocytic infiltrates with local proliferation of histiocytes.

After a while granulomata developed throughout the mesoderm.

When *Candida* sp. was used to inoculate the eggs it was found that the lesions produced by it were predominantly in the ectodermal layer.

A comparison between *P. loboi* and *P. brasiliensis* showed that, while *P. loboi* caused lesions in the ectoderm and mesoderm of the allantois, *P. brasiliensis* caused lesions in the mesoderm only. *C. J. La Touche*

CASTELLOT, J. J., CREVELING, R. L. & PITTS, F. W. **Fatal Miliary Coccidioidomycosis complicating Prolonged Prednisone Therapy in a Patient with Myelofibrosis.** *Ann. Intern. Med.* 1960, Jan., v. 52, No. 1, 254–8.

ABERNATHY, R. S. **Clinical Manifestations of Pulmonary Blastomycosis.** *Ann. Intern. Med.* 1959, Oct., v. 51, No. 4, 707–27, 6 figs. [15 refs.]

"A series of 35 patients with blastomycosis has been reviewed. Disseminated lesions occurred in 28 patients, three exhibited cutaneous lesions only, and four had only pulmonary blastomycosis. Since pulmonary involvement was found in 27 individuals, particular analysis was made of the clinical manifestations of pulmonary blastomycosis. Symptoms included cough, sputum, fever, chills, hemoptysis, significant dyspnea and pleuritis. Physical findings were not impressive; however, free pleural effusions and pneumothorax were seen. Roentgenographic features similarly were not specific; the pattern found most frequently was one showing an infiltrative or fibrotic reaction, with pleural reactions and thoracic adenopathy occurring often. Infrequent patterns

included cavities, miliary lesions, pneumonia, and an appearance suggestive of bronchogenic carcinoma.

" No specifically diagnostic clinical pattern could be established for pulmonary blastomycosis. The occurrence of parenchymal pulmonary disease, in association with cutaneous, pleural, bone or thoracic nodal involvement, should strongly suggest the possibility of blastomycosis. However, because of the extremely varied clinical manifestations of pulmonary blastomycosis, this diagnosis should be considered in any pulmonary disease of undetermined origin."

DeFeo, C. P. & Harber, L. C. **Chromoblastomycosis treated with Local Infiltration of Amphotericin B Solution. Report of Second Case.** *J. Amer. Med. Ass.* 1959, Dec. 5, v. 171, No. 14, 1961–3, 2 figs.

A Puerto Rican farm labourer with chromoblastomycosis of the foot of 22 years' duration proved by biopsy and culture of *Hormodendron pedrosoi*, was treated by local infiltration of the lesion with a solution of amphotericin B. 4 weekly injections of 15 mgm. dissolved in 3 ml. of 2% procaine solution were given and the result was excellent. An ulcer, which had been present for 5 years, healed and a biopsy specimen taken 6 months after treatment showed no evidence of any fungi and cultures were negative.

This is the second reported case of a favourable response to amphotericin B in this disease [this *Bulletin*, 1959, v. 56, 658]. *Peter Abbott*

Harrell, E. R. & Bocobo, F. C. **Modern Treatment of the Systemic Fungus Diseases.** *Clin. Pharmacol. & Therap.* St. Louis. 1960, Jan.–Feb., v. 1, No. 1, 104–34. [270 refs.]

TROPICAL ENVIRONMENTAL CONDITIONS

Webb, C. G. **An Analysis of some Observations of Thermal Comfort in an Equatorial Climate.** *Brit. J. Indust. Med.* 1959, Oct., v. 16, No. 4, 297–310, 10 figs. [19 refs.]

The observations used in this analysis were made indoors in Singapore, where the climate is typical of the equator—warm, damp and windless, and with almost negligible variation during the year. Buildings are unheated, of open construction, and shaded from the sun and sky. The main part of the paper is prefaced by a short account of the development of work on human comfort.

Of the 14 subjects who made the observations one was a European, and the remainder were Asians or Eurasians. All were healthy adult males with an English education, and all had been trained in the use of simple instruments for the measurement of the thermal environment. The observers were asked to note their assessment of their overall thermal sensation on a prescribed scale, and then to make the thermal measurements, at intervals of half an hour

for roughly 6-hour periods, in their homes or offices. They wore the ordinary informal cotton clothing of warm climates. Altogether 393 sets of observations were available for the analysis.

In about 83% of the observations the air temperature was between 80° and 87°F., in 84% the partial pressure of water vapour in the atmosphere was between 23 and 26 mm. of mercury, and in 80% the air speed was about 50 ft. a minute or less. The temperature registered by the globe thermometer was observed as a routine, but as that temperature agreed very closely with the air temperature it was ignored in the statistical analysis.

From the relation between thermal sensations and the three climatic variables, air temperature, vapour pressure and air speed, as found by the method of partial correlation, the author has derived a "climatic index". This climatic index is defined as the temperature of still and saturated air which produces the same overall thermal sensation as does the climate observed, which is also the basis used for the widely known scale of effective temperature.

The equation for this climatic index θ is:—

$$\theta = 0{\cdot}574t + 0{\cdot}488p - 0{\cdot}231\sqrt{v} + 21{\cdot}23$$

where t is the dry-bulb temperature, in °F.,
p is the partial pressure of water vapour, in mm. Hg, and
v is the air speed, in ft./min.

The coefficient of correlation between thermal sensations and this index was found to be 0·65.

As an approximation the climatic index may be expressed as

$$\theta = \tfrac{1}{2}(t + t_w) - \tfrac{1}{2}\sqrt{v}$$

where t_w is the wet-bulb temperature in °F.

It is said that the error involved in using this approximation is commonly about 0·2°F., and not more than 0·4°F. over the range covered by the observations.

The author expresses the belief that this new Singapore index is an improvement on any other climatic index at present available for such climates.

Thomas Bedford

WEBB, C. G. **Thermal Discomfort in an Equatorial Climate. A Nomogram for the Equatorial Comfort Index.** *J. Inst. Heating & Ventilating Engineers.* 1960, Jan., v. 28, 297–304, 3 figs. [13 refs.]

In a recent paper [see above] the author put forward a climatic index based on observations made in Singapore. In the present paper he gives a revised index which has been designed to extend the range of applicability. Use has been made of an equation derived by the reviewer from observations made at temperatures lower than those prevailing in Singapore, and of the nomogram for predicted four-hour sweat rate (P4SR) given by MCARDLE and others and by WEINER. The data of the author, with some associated data, have been used to connect the other two scales.

Whereas the Singapore climatic index put forward in the earlier paper was expressed by a simple equation with constant coefficients, the new combined scale, referred to as the Equatorial Comfort Index, has been stated with variable coefficients, and a nomogram is presented. The nomogram is similar

in construction to the effective temperature charts. By definition the equatorial comfort index is the temperature of still and saturated air which is assessed to have the same effect on human comfort as the measured climate. The basis of the nomogram is described in an appendix to the paper.

When this new index is applied to the Singapore data the correlation of the index with thermal sensations is identical with that of thermal sensations with the earlier climatic index derived solely from the Singapore results. The coefficient of correlation is 0·65, as compared with a coefficient of 0·52 for the correlation between sensations and effective temperature, and one of 0·60 for sensations and wet-bulb temperature.

Probit regressions of the incidence of discomfort on the new index show a marked improvement in fit when compared with the corresponding regressions with the earlier Singapore index.

Hence the author claims that the equatorial comfort index is an improvement upon the earlier index, and the best available climatic index for use in connexion with thermal comfort under ordinary living conditions in an equatorial climate. He suggests that the new index is appropriate for use wherever people are acclimatized to a wet-bulb temperature of over 75°F., and lists the regions in which it may suitably be used. *Thomas Bedford*

MISCELLANEOUS DISEASES

East African Council for Med. Res. **Conference on Cardiovascular Conditions held at Kampala in January, 1959.** *East African Med. J.* 1959, Oct., v. 36, No. 10, 527–64, 4 figs. [Numerous refs.]

The 7 papers published here comprise a third of the material presented at this conference, a brief report of which appeared in the same *Journal*, vol. 36, No. 3, pp. 178–180.

Two of the papers deal with the incidence of heart disease in Africa (on the Tanganyika coast and in Matabeleland respectively) and two with ischaemic heart disease; the others are on unrelated topics, namely fibrosing diseases, the surgery of constrictive pericarditis and the cardiogram of healthy young Kikuyu.

Clinical diagnostic facilities are of course less refined in the under-developed than in the technically advanced parts of the world. But an even greater handicap to clinical and pathological study, as A. C. E. Cole points out (*Some Observations on Heart Disease in Dar es Salaam*, pp. 538–541), is the infrequency of autopsy in many countries. Nevertheless an interesting picture emerges from analysis of 54 cardiovascular deaths (races not stated) coming to autopsy at Dar es Salaam in the last 5 years. Hypertension accounted for over a quarter, followed by bacterial endocarditis, aortic disease and tuberculous pericarditis. Pyelonephritis was an important cause of hypertension. Only one case of myocardial infarction and none of endomyocardial fibrosis occurred in this series.

Analysis of the clinical records at the Sewa Haji (African) hospital showed hypertension with and without evident renal involvement again accounting for the largest group nearly half), and the largest number of deaths in hospital.

Syphilitic aortitis, rheumatic heart disease, pericarditis and pericardial effusion are other important groups, and endomyocardial fibrosis is mentioned as a possible cause of mitral disease.

Comparison of these findings with hospital records of Asian and European patients at Dar es Salaam reveals two points of contrast. In this group hypertension is more often essential than renal; and coronary occlusion is common, with a high mortality. These observations are in general agreement with experience in other parts of tropical Africa.

In a survey of cardiac disease at the Bulawayo African Hospital (*Cardiac Disease in the African in Matabeleland*, pp. 542–548) B. J. BALDACHIN found an incidence of 1·35% of total hospital admissions attributable to heart disease. The same difficulty in obtaining autopsy confirmation is noted. Here the largest single group is rheumatic heart disease (40%) followed by hypertensive (15%) and syphilitic (13%). Mitral valvotomy was performed for tight stenosis in 7 cases. Hypertension was not attributed to renal disease to the same extent as in Dar es Salaam Africans. Syphilitic aortitis and tuberculous pericarditis take the same place as in other parts of Africa. There is an interesting small group comprising elderly men and women with pulmonary heart disease attributable to chronic bronchitis; it was associated in 2 cases with a degree of silicosis, in none was it attributed to schistosomiasis. Congenital heart disease accounted for 8·7%. Endomyocardial fibrosis is considered on clinical grounds to be rare in Matabeleland, but is mentioned as possibly accounting for some cases in the undiagnosed group and as difficult to exclude in cases of pure mitral incompetence [this *Bulletin*, 1955, v. 52, 203].

These two papers provide interesting comparisons from two African populations whose environmental and other differences should repay study.

The rarity of coronary thrombosis in Africans is pointed by a report of a single fatal case in a male Gisu aged 60 from Eastern Uganda (S. A. SINGH, *Fatal Coronary Thrombosis in an African*, pp. 557–564). The patient was a peasant farmer of traditional, largely vegetarian, habits whose diet had contained little animal fat. There was a history of effort angina preceding the infarction which produced characteristic electrocardiographic changes of anterior infarction and was confirmed at autopsy. In a paper entitled *The Epidemiology of Ischaemic Heart Disease; the Importance of African Contributions* (pp. 532–537) B. BRONTE-STEWART shows how previously assumed racial differences in susceptibility have in several cases been shown to be environmental. He discusses some of the present day hypotheses on the pathogenesis of ischaemic heart disease and calls for diverse scientific disciplines to be brought to bear on the study of this problem in those parts of Africa where communities with different susceptibility to this disease live side by side.

Professor A. W. WOODRUFF discusses endomyocardial fibrosis against the background of other disorders characterized by marked fibrosis that are met with in the tropics (*Fibrosing Diseases of the Tropics—Some Possible Causes*, pp. 527–531). Factors of malnutrition, enhanced tissue reactivity to macromolecules (such as gamma globulin complexes), reduced corticosteroid production and Selye's work on the opposing effects of sodium and potassium or magnesium salts on experimentally produced subendocardial necrosis are discussed in turn as regards their possible role as a common chemicopathological factor evoking an excessive fibrosis in response to different agents of tissue injury in different situations.

As to endomyocardial fibrosis the author opens his paper with two questions: What is the initial lesion? and, What are the processes underlying the final state? The search for a common factor promoting fibrosis in the many diverse forms met with in the inhabitants of the tropics is probably more relevant to the second question than the first.

The same theme recurs in connexion with post-operative recurrence of fibrosis in the paper on *Surgical Treatment of Constrictive Pericarditis in Africans* (pp. 549–554) by E. GRATTON, N. AHMED and M. J. TEMPLER of Nairobi. These authors review the literature on the surgery of this condition, which they believe to be fairly common in Kenya. They describe 3 cases in detail and report 2 others, with successful results in all but the first in which constrictive fibrosis recurred after operation. The later successful results are ascribed to the transverse "suitcase" approach employed, the wider decortication, care in ensuring full expansion of both lungs at the end of operation, and perhaps to the more chronic stage of the pericarditis in the later cases. The question of cortico-steroid therapy to prevent recurrence of fibrosis is discussed, but these agents were not employed in these cases.

The Electrocardiogram in Fifty Normal Young Adult Kikuyu Males (pp. 555–556) by P. P. TURNER reviews the literature relating to this subject and describes his findings in 50 subjects. The most striking feature of the series was the low voltage of QRS, less than 5 mm. (calibration not given) in 37 out of 50 in the standard limb leads. Unusual features in praecordial lead T waves included biphasic T often associated with a raised RS–T segment, the end of the biphasic T being negative in these healthy adolescents, as reported by other authors. The RS–T deviation is stated to be significant but the extent of deviation is not given. This short paper is an important preliminary study which should be extended, and which requires, as the author states, long-term follow-up of the subjects whose ECG in youth shows variations from the accepted normal. In a more extensive study it would be useful to have details of the type of instrument employed, the calibrations used, the conditions under which recordings were made and the bodily physique of the subjects.

[These 7 papers give a useful idea of the wide range and interest of the topics discussed at the Kampala Conference. But without titles and summaries of the many other contributions and with no record of discussion the designation of this issue of the journal as a special conference number is rather misleading.] *A. W. Williams*

TROWELL, H. C. **The Acute Abdomen in Africans—the Approach of a Physician.** *Central African J. of Med.* 1959, Oct., v. 5, No. 10, 513–19. [24 refs.]

The author has set out in simple manner the more common forms of acute abdomen as seen in Africa in order to clarify the differential diagnosis for African physicians. Acute traumatic and gynaecological diseases have been omitted on the grounds that the physician is not generally called in to see such cases. [Yet there must be many hospitals in Africa where a physician has to take his turn in sorting and admitting all types of acute admissions.]

A table is shown (BURKITT, *East African Med. J.*, 1952, v. 29, 189) vividly illustrating the different pattern of acute abdominal emergencies in Uganda and

England. Whereas in Uganda 73% are due to hernia, in England 74% are due to appendicitis. In tropical Africa the obstructive group of acute abdomen forms almost nine-tenths of all cases, while in England it is the inflammatory and perforative group that predominate greatly. South Africa is intermediate in position, with Central Africa somewhere between tropical and South African figures.

The author discusses briefly 3 main groups, beginning with the inflammatory group. Appendicitis is still very rare outside the larger towns in tropical Africa, and the possible relationship with diet is mentioned. The need for care in the differential diagnosis of the tender mass in the right iliac fossa is stressed as well as the importance of remembering pelvic appendicitis as a cause of diarrhoea. Acute diseases of the gall bladder are also rare and the author quotes a finding in Johannesburg where gall stones were found in 30% of white women over the age of 60 but only in 3% of African women of similar age. Non-specific mesenteric lymphadenitis is dealt with more fully, presumably because few African physicians will be familiar with this condition which may simulate an acute abdomen and is still very rarely diagnosed in Africa.

The obstructive group is the predominant one, comprising 94·2% of acute abdomens at Kampala. Strangulated inguinal hernia is by far the commonest cause. Hernia is very common throughout Africa, and its incidence varies between tribes. The proportions of men to women and of inguinal to femoral are similar to those in other regions of the world, but sliding hernia is much more common and may be part of a general laxness of abdominal tissues in Africans. Congenital umbilical hernia is of very high incidence in some regions of Africa, but these hardly ever strangulate and remain reducible until the majority regress and disappear during childhood. Even those that do persist in adult life very rarely strangulate.

The author finally describes in rather more detail the obstructions due to massive *Ascaris* infection, to intussusception and to volvulus. In the first, there has usually been a period of poor health with the passage or vomiting of worms, from which stage a vermifuge may have precipitated an acute abdomen with a tender mass easily felt. It should be remembered that perforation of worms through the bowel wall may lead to peritonitis in addition to the obstruction. The form of intussusception that is characteristic of Africa is the primary subacute form which is common in parts of West and East Africa. In both this and in the commoner form of volvulus seen in Kenya and Uganda, it is the young adults who are most likely to develop the acute abdomen and there is usually a history of similar attacks before, with vomiting and constipation followed by diarrhoea. *J. R. Rose*

DANARAJ, T. J. & SCHACHER, J. F. **Intradermal Tests with *Dirofilaria immitis* Extract in Eosinophilic Lung (Tropical Eosinophilia).** *Amer. J. Trop. Med. & Hyg.* 1959, Nov., v. 8, No. 6, 640–43. [28 refs.]

Each person tested received an intradermal injection of the antigen [this *Bulletin*, 1957, v. 54, 1341; 1959, v. 56, 1061] diluted 1:48,000, into the skin of one forearm, while the same quantity of dog serum, diluted 1:8000, was injected into the skin of the other forearm which served as a control. "A reaction was considered positive if the test wheal had increased in average

diameter by 3 mm or more by the end of 20 minutes. Erythema and pseudopodia were ignored. To detect sensitivity to the antigen in individuals also sensitive to dog serum, the criterion was an increase in size of the test wheal to a diameter 3 mm or more greater than the diameter of the control wheal at the end of 20 minutes." With these criteria as a basis the test was carried out on 291 persons. In addition, all of these persons, with the exception of the 66 British subjects who had been in the country for less than 2 years, had their blood examined for the presence of microfilariae and their serum used for a filarial complement-fixation test (FCFT). The results obtained are summarized in the following Table.

Groups	No. of Cases	No. with microfilaraemia	No. with positive FCFT	Intradermal test % positive.
(1) Eosinophilic lung	69	None	69	100·0
(2) Mild eosinophilia	32	None	None	59·4
(3) Filariasis	49	17	12	73·5
(4) Normal Asians	75	None	None	53·3
(5) Normal British	66	Not examined	Test not done	4·5

" The intradermal test performed on 95 cases of eosinophilic lung [apparently these do not include any of the 69 patients mentioned above] who had been cured with diethylcarbamazine, showed a positive rate of 98·9 per cent. These patients initially had a positive FCFT, but after treatment the titers had gradually diminished and were negative at the time the intradermal test was done. Conversion of the FCFT to negative after treatment occurred within 10 weeks in the majority of cases."

The above results obviously point to filariasis as a causal agent of eosinophilic lung. In view of the fact, however, that none of the patients gave a past history of filariasis, or had clinical signs of the disease or showed the presence of microfilariae in their blood, and remembering that the reaction is group-specific and not species-specific, the authors consider it is " possible that eosinophilic lung is caused by a species of filaria whose normal host is not man ".

[This well documented paper contains considerably more information than is referred to in the above abstract; it should be read in the original by those interested.] *R. M. Gordon*

GELFAND, M. & BERNBERG, H. **Tropical Eosinophilic Syndrome. A Clinical Description of the Disorder as seen in S. Rhodesia.** *Central African J. of Med.* 1959, Aug., v. 5, No. 8, 405–11. [11 refs.]

This paper records that in Southern Rhodesia 41 of 400 Africans had eosinophil counts of 6% or more in a differential leucocyte count, and 50 of

400 Europeans had eosinophilia of this degree. References are made to the causes of "tropical eosinophilia" in other parts of the world, and in Africa.

The passage through the tissues of larval worms such as *Ascaris lumbricoides*, and *Toxocara* species, the possible infection of the human being by larval filarial worms which cannot reach maturity in this host, and the early phases of schistosomal infection, have all been shown to be causes of eosinophilia often associated with pulmonary symptoms and signs. The widespread distribution of helminths and schistosomes makes it difficult positively to exclude them as causes of eosinophilia in patients in Africa. A syndrome is described in some patients in Rhodesia characterized by marked lassitude and loss of interest in work, vague pains in the limbs or abdomen, sometimes cough, and occasionally enlargement of axillary or cervical lymph nodes. There is eosinophilia of varying degree. Case records are given of patients showing prolonged eosinophilia, some of whom had no response to treatment with antimony, arsenic or cortisone, while others showed a response to cortisone. One patient was eventually found to have *Acanthocheilonema* [*Dipetalonema*] *perstans* infection.

The authors consider that since many patients do not have symptoms or signs of respiratory involvement the word "pulmonary" should be omitted from the name of this syndrome. They urge the importance of careful clinical records of all cases of unexplained eosinophilia in Africa so that knowledge of this condition may increase and elucidation of its cause or causes may be achieved. *S. Bell*

PARASITOLOGY: GENERAL

BELDING, D. L. **Basic Clinical Parasitology.**

This book was reviewed on p. 429.

NAGATY, H. F. **Practical Parasitology.**

This book was reviewed on p. 430.

DOMINICI, L. M., MICHELONI, F., BIGOTTO, M. R. & PIVA, F. Diffusione delle parassitosi intestinali fra la popolazione infantile della Repubblica di San Marino. [**The Spread of Intestinal Parasites among the Population of the Republic of San Marino**] *Giorn. di Malattie Infettive e Parassit.* 1959, Nov., v. 11, No. 11, 944–50. [38 refs.]

The republic has an area of 62 sq.km. and a population of 14,000, of whom 7,000 live in 3 towns and the rest in the country where sanitation, especially in the matter of night-soil disposal, is often still at a low standard. There are 1,600 children approximately, aged 6–12 years, attending 22 primary schools.

Using both direct and enrichment techniques for this survey, the authors have examined stool specimens from 2,123 [2,126 in the text must be a misprint] subjects, 296 of whom were aged 5 years or under and 327 were 13 years or over. 1,313 (61·84%) were found positive. *Trichuris trichiura* was the most common, 45·50% of all the parasites found. The proportion of *Enterobius vermicularis* was 27·62%, of *Ascaris* 12·10%, of *Strongyloides stercoralis* 2·05%, of *Hymenolepis nana* 1·50%. 11·23% of the subjects had evidence of protozoal infections, but *Entamoeba histolytica* or its cysts were not seen and amoebiasis is unknown in the territory. 256 subjects carried more than one parasite.

The authors enquired into the clinical history of each person found positive, particularly if a child, and they attribute a variety of signs and symptoms which they met to the presence of the parasites. Only a minor proportion of the positive subjects had an eosinophilia.

To achieve good results a control programme should include sanitation improvements and health education as well as anthelmintic treatment.

J. Cauchi

WEINER, D., BROOKE, M. M. & WITKOW, A. **Investigation of Parasitic Infections in the Central Area of Philadelphia.** *Amer. J. Trop. Med. & Hyg.* 1959, Nov., v. 8, No. 6, 625–9. [13 refs.]

The authors examined, by the formalin-ether technique, single stool specimens from 385 schoolchildren in Philadelphia aged 8 to 12 years from similar social and economic environments. These children were classified as Puerto Rican, 167 children; white (not Puerto Rican), 169 children; and Negro (not Puerto Rican), 49 children. The stool examinations revealed that 83·2% of the Puerto Rican, 30·2% of the white and 51% of the Negro children were infected with one or more parasites. The percentages of *Endolimax nana* and *Giardia intestinalis* were highest among the Puerto Rican group, but those of *Dientamoeba fragilis* and *Trichomonas hominis* were highest among the Negro children. Other protozoa found were *Entamoeba histolytica, E. coli, Iodamoeba bütschlii*, and *Chilomastix mesnili*. Practically all the helminth infections were in the Puerto Rican children. Specific examinations for *Enterobius vermicularis* were not done, but a few infections with it were found.

Table 3 shows a comparison with the use of an amoebic prevalence rate (APR) based on the number of persons infected with *E. histolytica, E. coli or Endolimax nana* or a combination of the last two [*cf.* BROOKE *et al.*, this *Bulletin*, 1956, v. 53, 590] and a helminth prevalence rate (HPR) based on the number of persons infected with one or more of the helminths identified (*Trichuris trichiura*, " hookworm " [presumably *Necator americanus*], *Ascaris lumbricoides, Enterobius vermicularis, Strongyloides stercoralis, Hymenolepis nana* and *Schistosoma mansoni*). Both the APR and the HPR were highest for the Puerto Rican children, the very high HPR in these being primarily due to the high prevalence of *T. trichiura*.

Table 4 shows the result of an attempt to correlate length of residence in the United States with the prevalence of infection in the Puerto Rican children, 81·4% of whom had been in the United States for 6 years or more. In them the APR was " rather constant " for the 6 years. This maintenance of the APR suggested that the protozoa were being transmitted, a suggestion supported by

the rather high APR in the non-Puerto Rican children. These infections are not limited to tropical climates and may be expected wherever poor sanitation and hygiene exists [see below], so that good housing conditions are important.

The HPR on the other hand dropped significantly after the 6 years of residence and this was paralleled by the rates of *T. trichiura* and " hookworm ". This drop in the HPR, together with the rarity of helminth infections in the " native " children suggested that helminth infections were not being transmitted to any significant degree. It is generally believed that infections with *Necator americanus* are lost in 4 to 5 years and one would not expect *S. mansoni*, *S. stercoralis* and hookworm to occur in Philadelphia, a northern city with an urban environment. None of the children who had lived in the United States for longer than 6 years had hookworm infection.

Table 5 correlates the percentages of infected and non-infected children with the signs (pallor, pale mucosae, " pot belly ", oral ulceration, abdominal or muscular pains and upset stomach) recorded during interviews when the stool-kits were being distributed. The occurrence of these signs was higher in all the infected children, but the various racial groups were not equally represented in the categories used.

Table 6 shows results of a survey of the housing conditions of the Puerto Rican people in Health District 6 of Philadelphia, the procedures used for the survey being those used by the American Public Health Association for assessing the quality of housing, and the results were compared with those obtained by previous housing surveys of the Hawthorne and Haddington districts of Philadelphia. [References to the literature on these surveys are given.] 205 dwellings occupied mainly by Puerto Ricans and Negroes were completely studied, most of them being small to moderate in size (1–5 rooms) and only 12·7% being owner-occupied. Both the equipment and basic design of more than 50% of these dwellings were worse than marginal; more than a third of them had important maintenance problems; more than a third were seriously overcrowded and over 90% were judged to be extremely poor or sub-standard. The housing conditions in the Hawthorne district were somewhat better, and those in the Haddington district were decidedly better. These poor housing conditions must facilitate the transmission by direct contact of the infections studied. *G. Lapage*

BISHOP, Ann. **Drug Resistance in Protozoa.** *Biol. Reviews.* 1959, Nov., v. 34, No. 4, 445–500. [Numerous refs.]

This is a timely article on drug resistance in protozoa by an author who has herself made many contributions in the field. An addendum brings the subject-matter completely up-to-date and the impressing list of references indicates the wide field covered so that the subject now appears in clear perspective for those who read it.

The general conception of drug resistance in micro-organisms and the problems which it poses date principally from the start of the present century, and have loomed especially large in the treatment of trypanosomiasis in man and animals, and, though to a lesser extent, in malaria. The mechanism by which resistance arises is of particular interest to the zoologist and geneticist.

Whatever this mechanism may be the development of resistance is commonly accompanied by physiological changes. The manner in which change to resistant types is accomplished in the laboratory and the variety of reagents by which the change may be induced, as well as its stability when acquired, have been the subject of many researches. Spontaneous development of resistance in trypanosomes is rare. Sometimes it is not clear during treatment whether change in the parasite or host is the cause of resistance. The occurrence of cross-resistance has proved of value in indicating similarities in mode of action of different types of drug. Resistance of malaria parasites has developed almost exclusively to the newer synthetic drugs, and the use of drugs as prophylactics has tended to increase the incidence. In the laboratory, studies on the development of resistance to folic acid antagonists such as proguanil and pyrimethamine have attracted many workers, as have studies on synergic action.

Drug resistance in other protozoal infections such as piroplasmosis, coccidiosis and trichomoniasis is of less economic importance. No satisfactory evidence of resistance in amoebic infections is available and that occurring in free-living protozoa is of academic interest only. In the case of an organism such as *Paramecium* which can be maintained axenically and with a true sexual phase in its cycle, genetic analysis of the Mendelian type is possible. The absence of a sexual cycle in trypanosomes and the difficulty in maintaining malaria parasites in culture have made comparable studies impossible. Further knowledge of the physiology of these parasites is deemed essential.

[The formula of Berenil is given as p-p′ diamino . . . , but should be p-p′-diamidino. . . . The formula in the original article quoted is also incorrectly given but for a different reason.] *J. D. Fulton*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Rachou, R. G., Moura Lima, M., Ferreira Neto, J. A. & Martins, C. M. Alguns dados sôbre o comportamento de mosquitos de Ponta Grossa (Florianópolis, Santa Catarina). [**Observations on the Behaviour of the Mosquitoes of Ponta Grossa (Santa Catarina), Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1958, Oct., v. 10, No. 4, 417–27, 3 graphs. English summary.

Monthly 24-hour catches of mosquitoes coming to human bait, both inside and outside secondary forest near Ponta Grossa in Brazil, were made over the 3 years from May 1954 to April 1957. Total mosquitoes numbered 21,361, the identified species per genus being indicated in brackets: *Anopheles* (7), *Aëdes* (5), *Culex* (3), *Mansonia* (3), *Psorophora* (2), *Phoniomyia* (5) and a few unidentified specimens of some of these and other genera. The prevalent species were *Anopheles bellator*, *Aëdes scapularis*, *Culex mollis*, *Mansonia chrysonotum*, *Phoniomyia* spp., of which about 2,000 to 9,000 were taken;

Psorophora ferox, *Aëdes serratus*, *Culex coronator coronator*, *Culex p. fatigans* and *Anopheles cruzii cruzii* were fewer—about a hundred specimens or so.

Tables give details and graphs illustrate seasonal abundance and biting cycles for the prevalent species and also seasonal fluctuations in temperature, humidity and rainfall for the area. Temperature ranged from about 24°C. in January to just over 16°C. in June–July, with rainfall least in the latter period. Relative humidity remained between about 80 and 84% for most of the year. *Aëdes scapularis* appears to have been commoner in the first half of the year; other species, including *A. bellator*, are, on the whole, more abundant in the wetter months. The grouped species of *Phoniomyia* and *P. ferox* were taken on the bait mainly by day. *Culex mollis* and *M. chrysonotum* attacked at night with peaks towards morning and, particularly, in the evening hours. This was so also for *Aëdes scapularis* and *A. bellator* with, in addition, some biting throughout daylight hours.

These data refer to catches in the forest where the catches were higher than they were outside it, about 60 to 90% of the specimens (including *A. cruzii*) being taken in the forest. Of 77 *Culex p. fatigans* caught, however, only 13% were in the forest. *D. S. Bertram*

SENEVET, G. & ANDARELLI, L. Un nouveau caractère pour la diagnose des larves de *Culex*. [**A New Character for the Identification of *Culex* Larvae**] *Arch. Inst. Pasteur d'Algérie*. 1959, Sept., v. 37, No. 3, 447–61, 1 fig.

The siphonal index (length of siphon/width of siphon) and the siphon-saddle ratio (length of siphon/length of saddle) [this *Bulletin*, 1957, v. 54, 1135] have both been used in the taxonomy of the larvae of *Culex*. The two methods of estimating the length of the siphon are compared here, from measurements of 72 culicine species, including 45 species of *Culex*. The authors conclude that in some species one or other of the two indices is more constant, but that there is little to choose between them in other species. They have also examined the relationship between the width of the base of the siphon and the length of the saddle, and conclude that this character may be useful in the subgeneric classification of the genus. *B. R. Laurence*

HOSOI, T. **Identification of Blood Components which induce gorging of the Mosquito.** *J. Insect Physiol.* London. 1959, Oct., v. 3, No. 3, 191–218, 5 figs. [39 refs.]

"The peculiar stimulation of mosquitoes by host blood, which usually ensures gorging and subsequent dispatch of the food to the midgut, may be supposed to be either tactile or gustatory. Having examined various properties of dietary blood for their effects upon the feeding responses of *Culex pipiens* var. *pallens* Coquillett, evidence has been obtained that the blood stimulants are predominantly chemical, and that the responsible substance or substances must be some components of the erythrocytes as well as of other living cells, rather than the fluid part of the blood, but that it is neither haemoglobin nor any other compounds heretofore suspected. The blood stimulus, though exceedingly acceptable to the mosquito, differs qualitatively from that of sugars. NaCl and

similar inorganic chlorides in adequate concentrations also exhibit a slight degree of the blood-like stimulation. They are obviously rejected at higher concentrations. Osmotic pressure has no fundamental influence upon sugar feeding, but it can affect blood feeding, since hypotonic solutions of haemolysed erythrocytes are refused by the insect if they are not sweetened with sugar. Guided by such findings, it was possible to extract from ox blood cells a substance possessing the action of the blood stimulus. Through ion-exchange chromatographic separation this was identified as adenylic acid. Comparison of the effects of several nucleotides and their related compounds suggests that adenosine-5′-phosphates of blood cells afford the main stimulus which promotes gorging of the mosquito on a blood meal. Acceptability of the other compounds is also discussed in relation to their chemical structure."

CHEN, P. S. **Studies on the Protein Metabolism of** *Culex pipiens* **L.—III. A Comparative Analysis of the Protein Contents in the Larval Haemolymph of Autogenous and Anautogenous Forms.** *J. Insect Physiol.* London. 1959, Dec., v. 3, No. 4, 335–44, 6 figs. (4 on 2 pls.) [40 refs.]

HAMON, J. & LAMBRECHT, F. L. Description de *Culex* (*Culiciomyia*) *muspratti* n. sp. accompagnée de quelques notes sur les moustiques de la forêt d'Irangi, Kivu, Congo Belge. [**Description of** *Culex muspratti* **n. sp. and Notes on Mosquitoes of Irangi Forest, Kivu, Belgian Congo**] *Bull. Soc. Path. Exot.* 1959, Sept.–Oct., v. 52, No. 5, 582–7, 2 figs.

LAMBREMONT, E. N. **A Study of Acid Phosphatase of the Mosquito** *Aedes aegypti* **L.** *J. Insect Physiol.* London. 1959, Dec., v. 3, No. 4, 325–34, 6 figs. [12 refs.]

GRENIER, P. & MOUCHET, J. Note complémentaire sur la morphologie et la biologie de *S. ovazzae* Grenier et Mouchet, 1959 (Diptera, Simuliidae), espèce associée au crabe *Potamonautes chaperi* M.-Edw., dans l'Ouest Africain. [**Note on Morphology and Biology of** *Simulium ovazzae*, **a Species associated with the Crab** *Potamonautes chaperi* **in French West Africa**] *Bull. Soc. Path. Exot.* 1959, May–June, v. 52, No. 3, 373–85, 4 figs. (2 on 2 pls.).

Simulium ovazzae is a member of the *neavei* group of *Simulium* and the larvae and pupae have been found on crabs (*Potamonautes chaperi*) in French West Africa (River Noun). The male, female, larva and pupa are described here and compared with related species.

The larvae are found in the main river, where *S. damnosum* also breeds, attached to the branchial chamber of the crabs and also near the bases of the legs and eyes. No larvae were found on another species of crab, *P. aloysii-sabaudiae*, taken from a smaller stream flowing into the main river.

The feeding habits of *S. ovazzae* are not known. *B. R. Laurence*

DOW, R. P. & HUTSON, G. A. **The Measurement of Adult Populations of the Eye Gnat,** *Hippelates pusio*. *Ann. Entom. Soc. of America*. 1958, July, v. 51, No. 4, 351–60, 3 figs.

"A bait trap of new design is described. It was used in southwest Georgia to capture large numbers of the *Hippelates pusio* group (*H. pusio* Loew and *H. bishoppi* Sabrosky); other species also captured were easily recognized and removed from collections. In large catches where *H. bishoppi* was also taken, it was found practical to obtain satisfactory estimates of *H. pusio* by weighing the collections at a fixed humidity and determining the ratio of the species in samples of about 100 specimens. When *H. bishoppi* drops below 10% in the catches, the numbers of *H. pusio* can be estimated with the same reliability by identifying smaller samples. *H. pusio* reached its seasonal peaks from July through September; *H. bishoppi* showed a similar pattern but appeared to decline more rapidly. *H. pusio* was caught in small numbers when traps were located at a distance from any known attractants, with the object of sampling hypothetically uniform areas, but when traps were set beside animal enclosures it was taken in large numbers. The numbers of gnats trapped beside chicken pens were significantly correlated with the numbers of fowl in the pens. Net and aspirator collections made near and on mammals consisted almost entirely of *H. pusio*. The proximity of animal enclosures had little or no effect on the trap catches of *H. bishoppi*, and since this species was never taken under circumstances that would prove attraction to a mammalian or an avian host, its numbers should not be included with those of *H. pusio* for epidemiological purposes. The numbers of gnats observed about human subjects were found unsuitable for calculating a prevalence index, even though they were found to be correlated with the size of trap catches in nine communities with a wide range of gnat prevalence during a period when trapping showed a marked seasonal change. Gnats observed on and about the heads of children were significantly more abundant when the subject had a history of conjunctivitis, also when the child was 'active in the open' rather than 'inactive in the shade.'"

BRIDGES, R. G. **Pentachloro*cyclo*hexene as a possible Intermediate Metabolite of Benzene Hexachloride in Houseflies.** [Correspondence.] *Nature*. 1959, Oct. 24, v. 184, Suppl. No. 17, 1337–8.

The significance of degradation of gamma BHC by resistant house-flies has been the subject of considerable research [OPPENOORTH, this *Bulletin*, 1954, v. 51, 1006; 1955, v. 52, 488; BRADBURY *et al.*, *ibid.*, 1954, v. 51, 321; 1955, v. 52, 103; 1959, v. 56, 1203; *J. Sci. Food Agric.*, 1958, v. 9, 203; STERNBERG & KEARNS, this *Bulletin*, 1957, v. 54, 362]. It is agreed that the ultimate metabolites are water-soluble, but there is disagreement on the significance of pentachloro*cyclo*hexane (PCCH). Sternberg and Kearns [*loc. cit.*] found this compound in appreciable amounts and believe it to be the primary breakdown product; whereas Bradbury *et al.* found only small traces and consider that this is not on the major metabolic pathway.

The author of this note has found three possible sources for the compound chlorodinitrobenzene in fly tissues dosed with gamma BHC and treated by

the Schecter-Hornstein procedure (reduction and nitration). Since this chlorodinitrobenzene is the main evidence for PCCH, the suggestion is that alternative sources may have artificially inflated the figures in the Sternberg and Kearns paper. Another reason for distrusting PCCH as a main intermediate emerged from further tests by the present author. Resistant flies were injected with PCCH and then treated with radioactive gamma BHC. Subsequent analysis showed no hold up in degradation of the BHC, due to excess PCCH.

It is, of course, possible that the American fly strain used by Sternberg and Kearns employs a different defence mechanism from strains used in England.

J. R. Busvine

SMITH, A. **The Susceptibility to Dieldrin of** *Pulex irritans* **and** *Pediculus humanus corporis* **in the Pare Area of North-East Tanganyika.** *Bull. World Health Organization*. Geneva. 1959, v. 21, No. 2, 240–41.

Susceptibility levels to dieldrin of wild-caught fleas (*Pulex irritans*) and lice (*Pediculus humanus corporis*) were measured according to the technique of BUSVINE and NASH [this *Bulletin*, 1953, v. 50, 1176] and SEN (*Bull. Calcutta School Trop. Med.*, 1958, v. 6, 14). The insects were collected from villages in the Pare region of Tanganyika. This area had been sprayed with dieldrin over a period of approximately 3 years as part of another investigation [see DRAPER and SMITH, this *Bulletin*, 1957, v. 54, 917; and SMITH (see above, p. 448)]. Information presented in this paper was accumulated over 6 months, during which time the fifth and sixth spraying cycles had been completed. Fleas and lice from untreated areas were also tested.

The results of tests on fleas from the untreated region suggest a high "natural resistance" to dieldrin (44% mortality at 4·0% dieldrin) when compared with levels obtained by Busvine and Nash [*loc. cit.*] for *Xenopsylla cheopis*. Fleas collected from the Pare area two months after the fifth spraying cycle were more resistant than those from the untreated villages. Only 26% of these Pare fleas were killed by 4·0% dieldrin. However, Pare fleas collected six months after the fifth cycle, and one week after the sixth cycle, were as susceptible as those from the untreated area. Pare lice were less susceptible than those from an untreated region; 8% and 100%, respectively, were killed by 4·0% dieldrin. Both fleas and lice from Pare were "easily killed by DDT"—94% and 100% mortality, respectively, at 4·0% DDT.

The author also briefly mentions field observations on flea and lice infestations.

B. C. Fine

STARKOFF, O. Su alcune specie de Ixodoidea segnalate per la prima volta in Italia. [**Some Species of Ticks Recorded in Italy for the First Time**] *Parassitologia*. Rome. 1959, Oct., v. 1, No. 2, 83–9. [13 refs.]

The English summary appended to the paper is as follows:—

"The author refers on the following species of *Ixodoidea*, found in Italy

for the first time; *Argas persicus*, *Ornithodoros erraticus*, *Ixodes canisuga*, *Haemaphysalis otophila* and *Hyalomma detritum*."

HOOGSTRAAL, H. & KAISER, M. N. **Ticks (Ixodoidea) of Arabia with special reference to the Yemen.** *Fieldiana: Zool.* 1959, Apr. 22, v. 39, No. 28, 297–322, 3 figs. & 1 map. [Numerous refs.]

In 1951 the United States Naval Medical Research Unit at Cairo conducted a brief medical survey of the Yemen. The results of this survey have been published in a large series of papers and the present paper deals with the ticks collected in the Yemen and the surrounding Arab countries.

Of the 9,178 specimens of ticks collected in the Yemen, more than 80% belonged to the genus *Hyalomma* which are the most important ticks from a medical and veterinary standpoint in Arabia.

Three species of soft ticks were obtained: *Argas persicus, Ornithodorus savignyi*, which are well known for their bites, and a larval *Ornithodorus* from a mouse which is described and figured. The hard ticks, which included larvae, nymphs and adults, were: 2 species of *Amblyomma* (*gemma* and *variegatum*) from hares, fox, gazelle, domestic cattle, camels, dogs and man; 1 species of *Aponomma* (*latum*) from a snake; 1 species of *Boophilus* (*annulatus*) from domestic cattle, camels, dogs, goats and sheep; 2 species of *Haemaphysalis* (*leachii*, the subspecies *leachii* and *muhsami* collected from the Arabian fox, and larvae and nymphs of an undetermined subspecies from spiny mice and grass rats; the species *sulcata* from cattle and 3 species of lizards); at least 4 species of *Hyalomma* (*anatolicum*, including the two subspecies *anatolicum* and *excavatum*; *dromedarii*, *impeltatum* and *rufipes*) from a variety of animals including the hare, rats, gerbils, cattle, goats, sheep, camels, dogs and man; 1 species of *Ixodes* (*hoogstraali*) from jirds which is described and figured; and 3 species of *Rhipicephalus* (*evertsi evertsi*, *simus simus* and *sanguineus sanguineus*) from rodents, cattle, camels, donkey, dogs, a captive hyaena, sheep, goats, cats and man. Adults of *Amblyomma variegatum*, *Hyalomma rufipes* and *Rhipicephalus sanguineus sanguineus* were taken engorging on human beings.

A list of wild animals which were examined and found to be negative for ticks is given in the text. Animals harbouring ticks included 1 species of snake, 3 species of lizard, 1 species of shrew, *Rattus rattus*, the commensal mouse, Arabian fox, hyaena, hares, grass rats (*Arvicanthis niloticus naso*), spiny mice of the genus *Acomys*, gerbils, jirds, gazelles, camels, cattle, goats, sheep, dogs, cats, donkeys and man.

In addition to the ticks collected from the Yemen, the paper contains records of the following species taken from the neighbouring Arab countries at one time or another: *Argas persicus*, *Argas* sp. (*reflexus* group), *Ornithodorus coniceps*, *O. tholozani tholozani* (both species infected with spirochaetes), *Hyalomma anatolicum anatolicum* and *Rhipicephalus sanguineus sanguineus*, from Transjordan; *Hyalomma anatolicum anatolicum* from Trucial Oman; *Hyalomma anatolicum antolicum*, *H. dromedarii*, *H. impeltatum impeltatum* and *Hyalomma* spp. from Saudi Arabia; *Aponomma gervaisi* and *Amblyomma variegatum* from southern Arabia; and *Ornithodorus savignyi*, *Hyalomma anatolicum anatolicum*, *H. dromedarii* and *Rhipicephalus sanguineus sanguineus* from Aden colony and Aden Protectorate. *M. G. R. Varma*

LUH, Pao-Ling & WOO, Wei-Chu. [**A List of Chinese Ticks**] *Chinese J. Entom.* 1950, Dec., v. 1, No. 2, 195–222. [Numerous refs.] [In Chinese.] [Translation 19, Dept. Med. Zool., U.S. Nav. Med. Res. Unit No. 3, Cairo.]

The authors have put together all the available records up to 1945 of Chinese, Formosan and Tibetan ticks (Ixodoidea) to produce this useful catalogue. A total of 39 species, 7 subspecies and 2 varieties belonging to 8 genera are listed. Under each species, synonyms, a list of the hosts and the distribution in China and abroad are given. The genus *Argas* is represented by 2 species, while there are no records of *Ornithodorus*. The genus *Amblyomma* is represented by 5 species, *Boophilus* by 4, *Dermacentor* by 6, *Haemaphysalis* by 10, *Hyalomma* by 1, *Ixodes* by 8 and *Rhipicephalus* by 3 species. The extensive bibliography lists over 100 references.

[Some of the species listed by the authors may have to be discarded as synonyms after detailed study and comparison. However, this does not detract too much from the usefulness of the paper to acarologists outside China. Since most of the papers from China, including the present one, are in Chinese, the translation service provided by the U.S. Naval Medical Research Unit-3 at Cairo, and distributed by them, will be welcomed by all those interested in ticks.] *M. G. R. Varma*

HESLOP, J. P. & RAY, J. W. **The Reaction of the Cockroach** *Periplaneta americana* **L. to Bodily Stress and DDT.** *J. Insect Physiol.* London. 1959, Dec., v. 3, No. 4, 395–401, 2 figs. [10 refs.]

LAIRD, M. **Biological Solutions to Problems arising from the Use of Modern Insecticides in the Field of Public Health.** *Acta Tropica.* Basle. 1959, v. 16, No. 4, 331–55. [Numerous refs.]

This interesting paper discusses first how the non-selective nature of contact insecticides and their use on extensive scales cause unbalance in animal populations in nature, and instances how this may create, as it has already in certain circumstances, fresh problems in the control of pests and vectors of disease. Insecticide resistance within vector populations is one well-known aspect; differential kill of obnoxious insects and their predators is another; other subtler interferences in the balance of nature and their results are commented upon, and the fact that too little is known of this sort of effect, and how it may rebound later, is emphasized.

An account is then briefly set out of methods of control other than those calling for widespread use of non-selective chemicals. First, more care and precision in their use; but other opportunities suggested for more exploration are trapping and killing based on devices to attract by sound (mosquitoes etc.), kill by ultrasonic vibrations (snail and schistosome stages), fly control by sterilized males, besides reconsideration of the advantages of species sanitation and new ways of interfering with mosquito aquatic and adult life. Habits of male mosquitoes require fuller study which could, possibly, indicate means of upsetting population growths by control of the males.

About half the paper, however, is about parasites and predators and with particular regard, although not exclusively, to the prospects and possibilities of utilizing them against mosquitoes. Parasites are thought to be the more promising approach, especially microsporidia among protozoa, and fungi of the genus *Coelomomyces*. For the latter, a field experiment on the Tokelau Islands in the Pacific is in progress to assess possibilities of controlling *Aëdes polynesiensis*, vector of filariasis, in the aquatic stage and comparing results with dieldrin-cement briquettes as an antilarval measure. This is still in progress and may be further elaborated by introducing other competitive life, both aquatic and terrestrial.

Eradication is not anticipated, but a case is argued briefly for the potentialities of such methods as being economical and useful in keeping vector populations below levels necessary to disease transmission, with the use of contact insecticides only for particular circumstances. The atolls of the Pacific are advocated, on several considerations, as being particularly suitable for field studies on the effectiveness of introducing predators and parasites for vector and pest control. *D. S. Bertram*

MISCELLANEOUS PAPERS

Díaz Lira, G., Ponce de León, J., Lube, Cato & Montalvo, A. Evaluación de una película en una población andina del Perú. [**Evaluation of a Film by People living in the Peruvian Andes**] *Bol. Oficina Sanitaria Panamericana*. 1959, Dec., v. 47, No. 6, 520–25, 1 fig.

This paper describes the impact of a health education film on primitive people.

In 1952 Cornell University became interested in the small village of Vicos, on the slopes of the Andes in the Province of Carhuás, as part of the Peru-Cornell Project. Vicos has a population of 2,250 spread over a wide area and their customs and mode of life differ little from those of their forebears, the Incas. They are engaged in agriculture and stock-raising. They are superstitious and believe in magic. Sanitary conditions are deplorable: pure water is scarce: many live in mud houses, without light or ventilation, which they share with live stock. Only one film had ever been shown when it was decided to show a film on health: the previous one had been on the production of food.

There were preliminary discussions between the Peru-Cornell Project, the health education unit at Huaraz and the Institute of Ethnology at Lima when it was agreed that the film to be shown should be "Kill the Louse" which dealt with exanthematous typhus fever which is endemic in the district. The commentary was in the dialect spoken in the area: a doctor who spoke the dialect introduced the film and at its conclusion invited questions. The film showed people infested with lice who developed fatal typhus fever; then shots of local scenes with healthy people enjoying life and finally urban scenes showing good hygienic practices.

About 60 people attended and when questions were invited, some of the

men, but none of the women, went out. A week later an attempt was made to evaluate the results by asking the 60 attenders 4 simple questions.

The local term for typhus fever is *tabardillo* and that this was the typhus fever which the film was about had been stressed by the doctor who spoke at the film show: not a single one who was questioned realized that *tabardillo* was spread by lice: nor did anyone know that *tabardillo* was contagious: they had, however, gathered that *tabardillo* was associated in some way with dirt.

They remembered familiar scenes which had been shown on the screen but said that the unfamiliar ones, such as the urban views, confused them. They could not realize that the film had any relationship to themselves and thought that the lice were too big and of the wrong colour and so could not be real. The need for washing underclothing had, however, been understood.

The conclusion is that the majority of the audience absorbed virtually nothing from the film: they were unable to understand that it was a connected whole and regarded it simply as a collection of isolated and unrelated incidents. They were confused by the colour and the magnification.

The final remark is that educational films do not cause any striking change in the customs, beliefs and attitudes of primitive people and that their sole value is to supplement other [unspecified] methods of instruction.

Allen Daley

REPORTS AND SURVEYS

INDIAN COUNCIL OF MED. RES. **Clinical and Experimental Research.** Work done by Clinical Research Unit, under R. N. Chaudhuri at School of Tropical Medicine, Calcutta (1952–59). 30 pp., 35 figs. [Numerous refs.] [1960.]

This publication summarizes under appropriate headings the work done by the Clinical Research Unit of the Indian Council of Medical Research under Dr. R. N. Chaudhuri at the School of Tropical Medicine in Calcutta during the years 1952 to 1959. Before that time the Council sanctioned the "enquiries" of individual investigators on a year-to-year basis. The Clinical Research Unit was established in 1952 by merging the existing enquiries on the chemotherapy of malaria and on epidemic dropsy and extending the field of study to clinical problems relating to diseases prevalent in India of special importance to the health of that country.

The present review therefore includes some of the studies initiated before the Unit was established and continued by its staff. Much of the work will be familiar to readers of this *Bulletin* (and indeed *Bulletin* abstracts are quoted at the end of the list of references which follows each subject), but this composite summary, with its many illustrations, gives a clear picture of the nature and scope of material studied.

The subjects investigated were as follows:—

(1) EPIDEMIC DROPSY: experimental studies on argemone oil and its alkaloid; biochemical and haematological investigations; laboratory test for argemone oil in adulterated mustard oil; treatment

(2) MALARIA: chemotherapy; effect of newer antimalarials on sporozoite development in mosquitoes; chemoprophylaxis; hepatic function
(3) CHOLERA: drug treatment; treatment of uraemia; biochemical studies on electrolytes; renal function
(4) TROPICAL SPLENOMEGALY: clinical and pathological studies of 203 cases; role of experimental malaria in rats; epidemiological investigation
(5) DIABETES MELLITUS: clinico-pathological study of 8 cases; experiments on rats
(6) AMOEBIASIS: description and use of device for experimental study in animals; liver biopsy studies
(7) TROPICAL EOSINOPHILIA: aetiological investigations; attempts at experimental production in animals and in volunteers; epidemiological study; clinico-pathological investigation and treatment.

Each section is followed by a short comment on the problem and on the investigation.

This account is a valuable summing-up of the work done by the Unit in the period under review and is an admirable reflection of the wide range of valuable investigations being pursued by Dr. Chaudhuri and his colleagues in Calcutta. *H. J. O'D. Burke-Gaffney*

ERRATUM

In the title of the review of the Thesis by VEEGER, L. M., this *Bulletin*, 1959, v. 56, 1297, please delete "Leiden: Laboratorium voor Parasitologie, Rijksuniversiteit, Holland" and substitute "University of Amsterdam".

BOOK REVIEWS

STONE, Alan, KNIGHT, Kenneth L. & STARCKE, Helle. **A Synoptic Catalog of the Mosquitoes of the World (Diptera, Culicidae).** 358 pp. 1959. Wash. 5: Entomological Society of America, 1530 P Street, N.W., D.C. (for The Thomas Say Foundation).

This is the first comprehensive catalogue of the mosquitoes since EDWARDS's *Genera Insectorum* monograph of 1932 [this *Bulletin*, 1933, v. 30, 915]. At least as long an interval may be anticipated before the publication of another. In the interim it will be an indispensable work of reference for those interested in the group. It is therefore a very real pleasure to be able to vouch from personal knowledge for the devotion and integrity with which it has been prepared. It is understood that as far as possible it will be kept up to date by means of supplements.

Edwards's monograph included 1,407 recognized species. This catalogue includes 2,426. The treatment of higher categories is conservative. The number of recognized genera and subgenera has been increased by only 21 from Edwards's figure of 89 and the number of tribes from 3 to 4. This is a

wise policy. Although many of them cannot be concisely defined the currently accepted genera and subgenera present little difficulty, in practice, to anyone with a modicum of experience. They can and will be improved in the course of regional studies. Their revision *in toto* would have been a Sisyphean task which the authors are wise to have avoided.

The general approach is more rigorous than that of Edwards. Thus, while the latter included keys and generic and subgeneric descriptions which he must have known to be only partly valid, the present authors have preferred to omit these altogether. New names are not very numerous. Such as they are they will probably, as always, cause annoyance, especially, perhaps, the substitution of *Cellia* for *Myzomyia*. In this, as in other cases, the authors have preferred to adhere rigidly to the rules of nomenclature and to strive for authority and permanence, if at the cost of some temporary breaches of the peace. Although they have made a personal study of very many type specimens they have, in general, followed the best recent authority when such authority was available. It is a remarkable fact that they have contrived to see all but two of the original descriptions associated with the 4,400 names included in their catalogue. Under each name are references to important literature published since Edwards's monograph. These cover general biology as well as taxonomy. The resultant bibliography of some 750 references, though selective, is far in advance of anything else currently available and should greatly facilitate the compiling of more extensive specialist bibliographies. It is understood that, with the possible exception of *Culex quinquefasciatus*, which is likely to remain *Culex fatigans* on this side of the Atlantic, the names in this catalogue are to be accepted as standard by the *Tropical Diseases Bulletin*. It is to be hoped that other abstracting journals will follow suit. This will be a bible for many mosquito workers, and a worthy one.

P. F. Mattingly

CHATTERJEE, K. D. [M.D.] **Parasitology (Protozoology and Helminthology) in relation to Clinical Medicine.** 2nd Edition. 188 pp., numerous illustrations. 1959. Calcutta-26: 6, Amrita Banerjee Road. [Rs. 17.50.]

The quick appearance of a second edition of this book in two years [this *Bulletin*, 1958, v. 55, 467] indicates the attractiveness of the first; it is certainly true that the work compresses into a handy size the subjects of medical protozoology and helminthology, and both students and practitioners will undoubtedly continue to find it useful. The size of the book has scarcely been increased, but about 20 illustrations have been added and the text has been brought up to date by small alterations. Thus in the chapter on the amoebae modern ideas about pathogenicity are briefly mentioned, *Trypanosoma rangeli* is added to the list of human trypanosomes, but without a discussion of its effect, new knowledge about the life cycle of the malaria parasites is included in the text and tables, the role of animal reservoirs in filariasis is briefly referred to, modern introductions into the therapy of helminth infections are mentioned, and finally an extra appendix is given which summarizes the present knowledge about *Toxoplasma* and just mentions *Pneumocystis*.

The general form of the book and the illustrations are of a high quality, while the continued emphasis on the clinical aspect of parasitology will make

it welcome to medical practitioners in the tropics. The range of the book lies between those of "Aids" or "Summaries" and of a formal textbook, but nearer to the former. *P. C. C. Garnham*

BURROWS, Edmund H. **A History of Medicine in South Africa up to the End of the Nineteenth Century.** 389 pp., 32 pls. & 16 figs. 1958. Cape Town. Amsterdam: A. A. Balkema. [63s.]

This is a monumental book which carries the history from the early part of the 17th century, when Bontius visited the Cape, to the end of the 19th century. The first medical settlement was made by Van Riebeeck in 1652, whose duty it was to organize a re-victualling post for ships on the way to East India.

The author traces the story of gradual extension of medical facilities, first in the Cape area and along the coast, and then further inland, and intersperses his well documented narrative with short biographies of innumerable men from Britain and Holland. He tells his tale in an attractive and stimulating style, dealing with the mass of information crisply, in spite of the fact that he gathered it from a very large number of sources. At the end of each chapter there is a long list of references—to histories, South African newspapers in English and Afrikaans, and to local medical journals. At the end of the book there is a comprehensive list of references.

The times covered by this history were harsh, and the medical and surgical problems were intractable. The people who colonized the country were strong and courageous, and this aspect of their life comes out well in the account of the great treks inland. The author has told their story well. He has not written a history of disease in South Africa, but has kept his narrative to a more personal note, to an account of the people and what they did, and of their peculiarities. The book will remain as a record of many notable men and women who might otherwise have been forgotten. *Charles Wilcocks*

Printed in Great Britain by The Eastern Press, Ltd., London and Reading